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THE

IRON AGE

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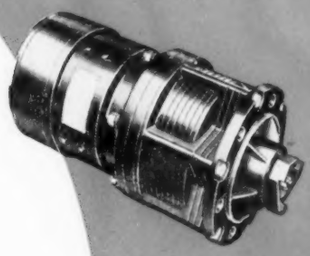

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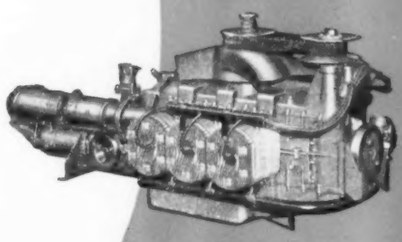

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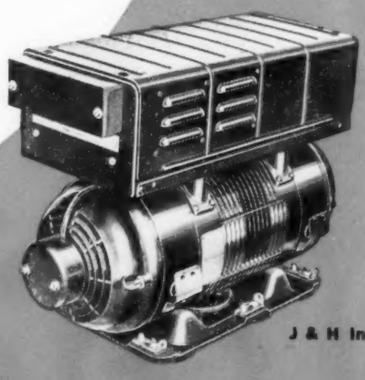

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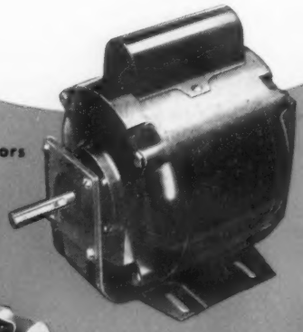
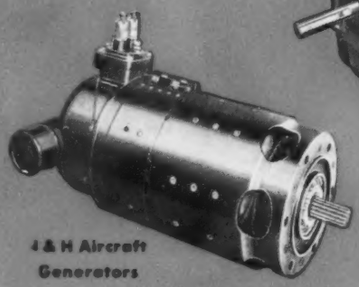


J & H Fractional Horsepower Electric Motors



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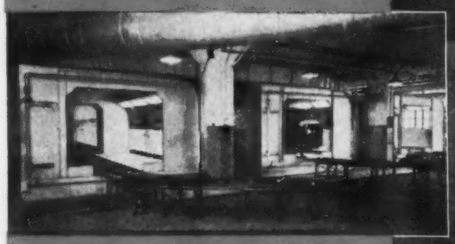
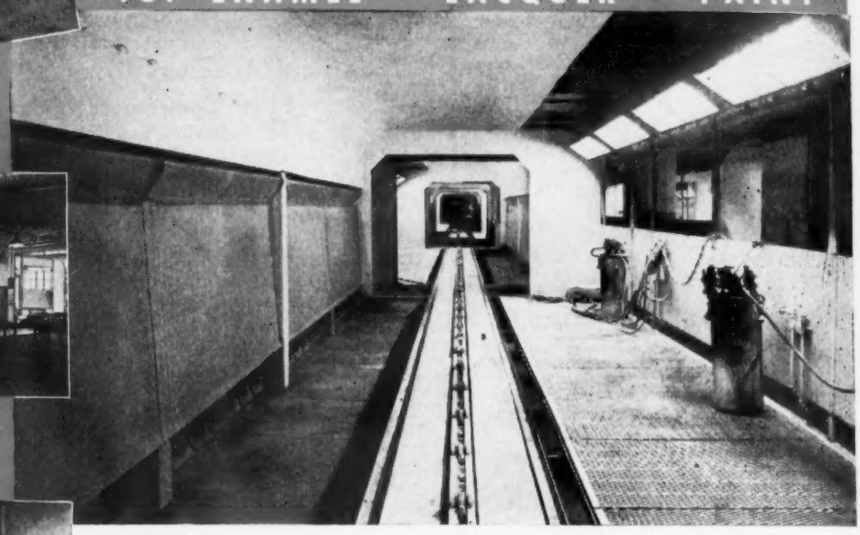
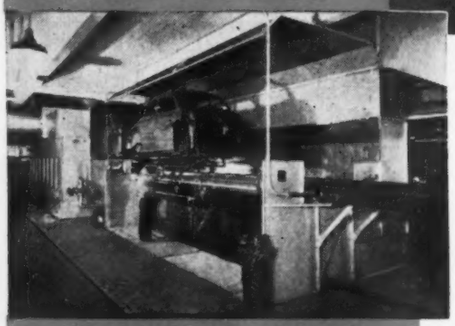
Metal Cleaning and Rust Proofing Equipment—part of this Complete Finishing System.

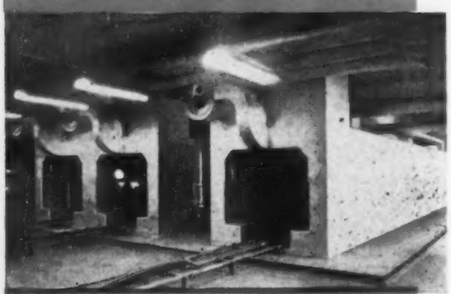


At right and above—Mahon Hydro-Filter Spray Booths for finishing sides and tops of Bodies—part of this Complete Finishing System.





Mahon Hydro-Filter Spray Booths for painting underside of Automobile Bodies—part of same installation.



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Supposing—

SUPPOSE that the anti-trust laws did not exist, nor did other measures restricting people from monopolizing industries and thus imposing their will upon the people. Suppose that the Supreme Court of the United States ruled that employers were free to use coercive measures, even to the point of violence, and to levy tribute upon their employees and their fellow citizens at will.

Then suppose further that under these conditions and circumstances the "Great American Steel Corporation" was formed and swallowed U. S. Steel, Bethlehem, Republic, National, Inland, American Rolling Mill and in fact 90 percent of the existing steel producers.

Suppose still further that the "United Amalgamated Automobile and Aircraft Manufacturing Corporation" was formed and swallowed General Motors, Chrysler, Ford and perhaps 90 percent of all of the automobile and aircraft producers. And while we are at it, suppose that the "Volcanic Coal Corporation" was formed and swallowed Pittsburgh Consolidated, Peabody, Koppers and enough of the other coal producers to control 90 percent of the industry.

Then, after these enormous and powerful monopolies were perfected, suppose that the few individuals comprising their top management issued an ultimatum to the public demanding exorbitant price rises under penalty of shutting off these basic products and services and thereby immolating 130 million Americans through economic stagnation.

How long do you think it would take the President of the United States, regardless of party, to come to the rescue of the people? Or if he lacked power to do so, how long would it take Congress to give him that power? Or if Congress failed to do that, how long do you suppose it would be before an outraged public let its legislative representatives know what it would do to them if they did not?

Naturally such a situation cannot arise with respect to the power of proprietorship because of the anti-trust and other laws which have been passed to prevent it. But these laws and the court interpretations of them have left a loophole from which an equally damaging set of industrial monopolies has emerged and is in full flower. Labor monopolies. Monopolies in which one man who may represent but a fraction of one percent of our population has the remainder at his mercy.

So today we find ourselves living in a world in which men have made themselves more powerful than government, and in which at their nod or the lifting of a finger, we may find ourselves at any moment deprived of heat, of transportation, of basic materials, of jobs, yes, even of food.

The remedy is a simple one. Monopolies of any kind, be it capital, labor, religion or political power are dangerous things. No man or group of men should be permitted to have their power as private citizens extend over the length and breadth of their country or over the length and breadth of any entire industry. Labor unions must no longer be exempt from these laws which were enacted not for the protection of privileged groups but for the protection of all the people.

The Trained Eyes at Inland—

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Tensile Strength Testing

Spectographic Test for Elements

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Every day, year in and year out, ton after ton of steel passes the scrutiny of Inland's "trained eyes" . . . Samples are gathered from all operations and subjected to exacting tests before the steel is permitted to be rolled into final form.

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Inland steelmakers working together closely, carefully on each individual order means *that* order will "measure up" to every requirement when delivered.

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INLAND STEEL

► At Atlantic City, Philip Murray reassured those in industry who expect the steel union to go on a rampage for higher wage rates if the coal miners get a better deal than the steel workers.

He made it plain that the present contract will be scrupulously adhered to until Feb. 14, 1947. New demands will be discussed this fall with the guaranteed annual wage being the No. 1 bargaining point.

► Personal differences evidently do not interfere with good business as witnessed by the extensive industrial exhibits of U. S. Steel and Alcoa at the Steel Workers convention in Atlantic City last week.

► It is understood that U. S. Steel is ready to offer 3 3/8¢ a hr to clear up inequities among various labor classifications. The WLB some time ago recommended that no more than 5¢ an hr be granted.

This will be granted concurrently with a complete simplification of steel labor classifications in the corporation.

► Although unsuccessful at one election at the Geneva Steel Works, the United Steel Workers of America will soon get another chance. An election to determine the sole collective bargaining agent is scheduled. However, only a handful of workers remain of the once 5000 on the payroll.

► If Utah congressmen have anything to say, and they are expected to say much, U. S. Steel will get the Geneva Works. New grist for the speculators' mill is the report that two bidders have withdrawn from the contest.

► Latest Lloyds Register shipbuilding returns indicate that over half of the world tonnage building is in British yards. This compares with a 1933-1938 average of slightly over 40 pct.

British shipping operators are complaining officially in regard to repair costs in British drydocks which they assert are at least 2½ times the prewar level. British shipowners are also troubled by the high cost of new building which is now over 75 to 100 pct higher than prewar levels.

► Box score of British housing progress shows 30,000 houses completed since the war, 84,000 under construction and 66,000 projected but not yet begun. These figures represent an increase during March of 6000 houses completed and 20,000 under construction.

The totals include 6000 permanent houses and 24,000 temporary houses completed, 65,000 permanent houses and 18,000 temporary houses under construction.

► Surplus property "fire sales" have begun in Europe with the slashing of list prices on jeeps, trucks and weapons carriers now rusting in OFLC depots on the Continent.

► Britain's famine of brickmakers has made the government reverse the draft to get brickmakers out of the forces and into the brickworks. These men will remain in uniform, draw Army pay and allowances and will be fed on service rations.

► The three current focal points of national defense are: Washington (Operation Crisscross), Bikini (Operation Crossroads) and the Bronx (Operation UNreal), according to the Army Ordnance Assn.

► Attempts to secure supplies of copper wire over the past several months have led some consumers to desperate measures, particularly those in the jewelry and motor fields.

Redrawers are getting 40¢ a lb for drawing wire to smaller sizes, with the buyer supplying the wire and in some instances underwriting purchase of drawing machinery.

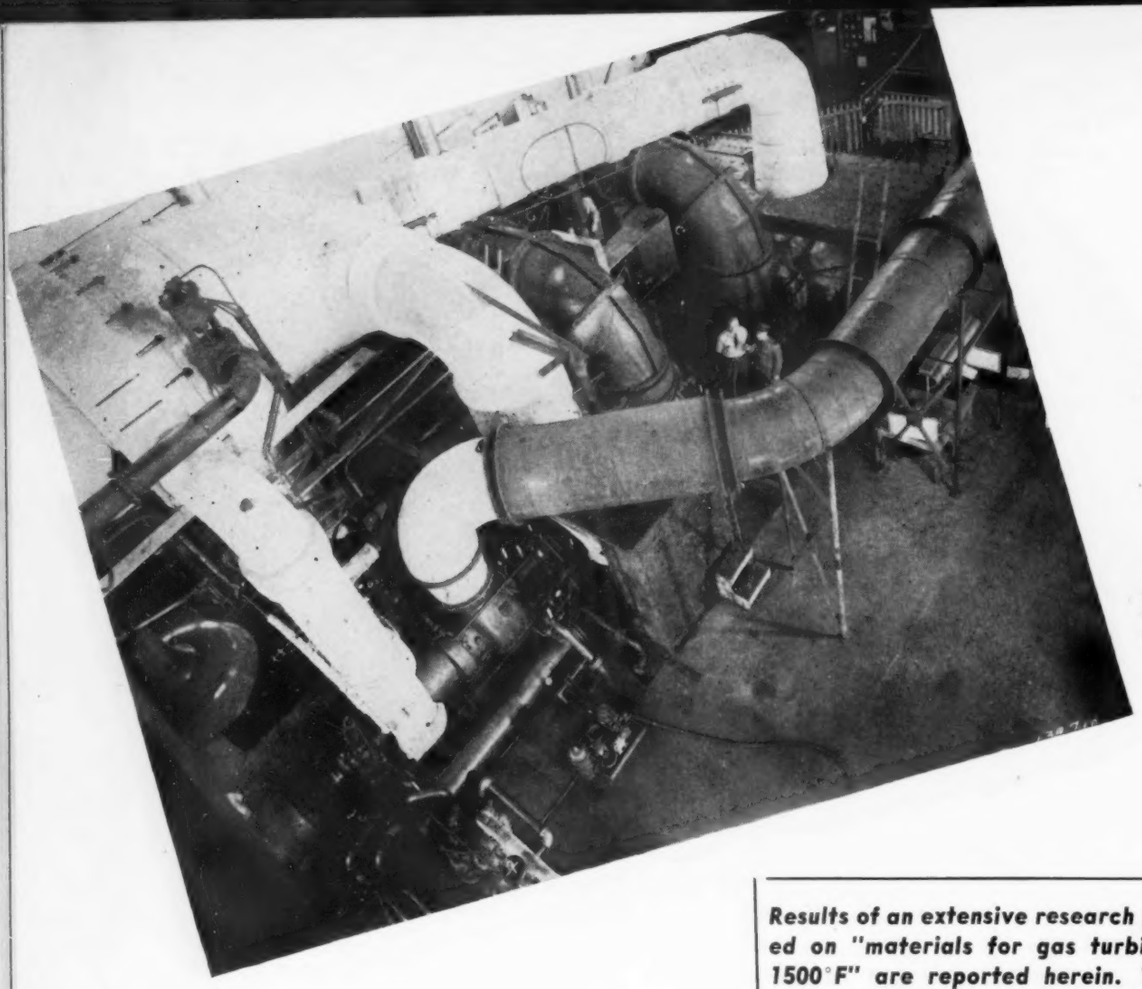
Large tonnages of copper wire have been shredded of insulation and redrawn and shipments have been brought in from South America for the same type of processing.

► The name precision casting evidently did not make the foundrymen happy. They are now calling the lost wax process precision investment casting.

A patent suit on the process resulted in the decision by a U. S. District Court that the process is patentable.

HIGH

By N. J. GRANT
Massachusetts Institute of Technology



● Allis - Chalmers gas turbine installed at the Naval Experimental Laboratory, Annapolis, Md.

Results of an extensive research program conducted on "materials for gas turbines operating at 1500°F" are reported herein. This subject is of vital interest to the many activities concerned with gas turbines, jet propulsion and allied work. The tests were conducted for the Navy under Bureau of Ships Research Memorandum No. 1-45.

THIS report is a summary covering almost three years of intensive research work with high-temperature, high-strength alloys conducted at the Massachusetts Institute of Technology. The research was concerned with two goals. First there was the general aim of developing superior alloys for performance in gas turbines at about 1500°F. As a second aim there was the task of finding the effects of nitrogen and carbon on certain nickel-chromium-cobalt-iron base complex alloys, and the relative effects of tantalum and columbium on these same alloy systems. In the meantime as further important alloy behaviors were noted, the program was broadened to permit the study of particular processing factors such as surface polishing of specimens, temperature of investment molds, etc. Finally the high carbon vitallium type alloys were also included in the program when certain tests indicated the extreme strength of these alloys without the corresponding low ductility noted in the Ni-Cr-Co-Fe base alloys. Also, tests at 1600°F. were added to the previous testing done at 1500°F. These tests were made on both the Ni-Cr-Co-Fe base alloys and on the high carbon vitallium type alloys.

Whereas the program was initially concerned with forging alloys alone, being thus restricted to the low carbon grades (under about 0.35 pct carbon), it was later shown that casting permitted a much broader range of possible compositions. Since the interest was primarily in developing superior blade materials, the program efforts were concentrated on the somewhat less ductile, stronger high carbon grades of alloys which are not forgeable and were required to be cast.

The initial minimum requirements called for materials which would show greater than 100 hr rupture life at 20,000 psi and 1500°F, and a minimum creep rate of 0.00001 pct per hr at not less than 7000 psi at 1500°F. A great many alloys were found which exceeded both these requirements by a wide margin. Accordingly the goal has been shifted constantly higher with regard to both the test temperature and the stress.

For a previous article on 16-25-6, Cr-Ni-Mo high temperature alloy, see THE IRON AGE, *Jan. 17 and Jan. 24, 1946.*

Test Materials—Table I lists the alloys which were tested in the forged and heat treated condition. All the alloys were cast into either 6 or 15 lb ingots. All the 15 lb ingots were forged by commercial forge shops whereas the 6 lb ingots were forged at MIT to get a more intimate picture of the forging problems, especially where certain compositions appeared to be critical.

Table II shows the forging temperatures used. All the forging was done in the temperature range of 1900° to 2250°F. Below 1900°F it was practically impossible to achieve any reduction in area regardless of the intensity of the blows. One or two of the alloys could not be forged above 2150°F and appeared to fail in the center of the bar.

It must not be assumed that an alloy referred to as "readily forgeable" is a truly plastic material in the

TEMPERATURE ALLOYS . . .

sense of forgeable carbon alloys, or even stainless steel. The term is used here only in a relative sense. Even at 2250°F several grades showed extremely little deformation, failing suddenly by cracking transversely across the ingot (TB, TA, TB). In no case was there a single bar found to be entirely free of cracks.

All ingots were allowed a preliminary soak of at least 1 hr at temperature. They were broken down with fairly light hammer blows, although this is now presumed not to have been too important. The bars were finally swaged into ⅞ in. rounds.

Tables III and IV show the results of rupture tests

TABLE I

Alloys Tested in Forged and Heat Treated Condition

(Underlined values are analyzed, others are air values)

Alloy	C	Mn	Si	N_2	Ni	Cr	Co	Mo	Ta	Cb	W	Others
TA (1)	0.10	0.7	1.0	0.143	30.0	20.0	..	6.0	2.97	5.10	....	....
TA (2)	0.09	0.7	1.0	0.15	30.0	20.0	..	6.0	4.07	5.25	....	....
TB (1)	0.06	0.7	0.5	0.135	29.7	19.76	2.	5.6	2.77	....	....	....
TB (2)	0.09	0.7	0.5	0.15	30.0	20.0	21	6.0	2.10	....	....	....
TC (1)	0.11	1.3	1.2	0.10	28.9	19.97	20	5.5	....	5.22	....	....
TC (2)	0.14	0.9	1.5	0.15	30.0	20.0	20	6.0	....	5.78	....	....
TD (1)	0.12	0.7	1.0	0.15	30.0	20.0	18	6.0	2.75	4.20	....	....
TE (1)	0.09	0.7	0.5	0.137	30.0	20.0	..	4.0	1.90	....	4.10	....
TF (1)	0.09	0.4	0.9	0.15	29.2	20.0	..	4.08	....	4.47	3.60	....
TG (1)	0.09	0.7	1.0	0.15	30.0	20.0	..	4.0	1.97	4.04	4.00	....
TAA (1)	0.10	0.7	1.0	0.15	30.0	20.0	..	6.0	1.92	4.10	....	....
SX (1)	0.07	0.7	1.0	0.15	27.5	17.5	..	6.0	....	4.19	....	....
SY (1)	0.15	0.7	0.5	0.12	35.0	12.5	23	5.0	....	....	2.50	....
SY (2)	0.21	0.7	0.5	0.12	35.0	12.5	23	5.0	....	....	2.50	....
SZ (1)	0.07	0.5	0.5	0.143	29.5	20.0	..	6.1	1.15	....	....	....
TE-O	0.04	0.7	0.7	0.15	30.0	20.0	..	4.0	3.67	....	3.67	....
TE-C1	0.23	0.7	0.7	0.15	30.0	20.0	..	4.0	3.26	....	3.67	....
TE-C2	0.45	0.7	0.6	0.15	30.0	20.0	..	4.0	3.32	....	3.67	....
TE-OA	0.07	0.7	0.5	0.15	30.0	20.0	..	4.0	5.63	....	4.00	....
TE-OB	0.09	0.7	0.5	0.15	30.0	20.0	..	4.0	3.51	....	4.00	....
TE-OC	0.08	0.7	0.5	0.15	30.0	20.0	..	4.0	4.43	....	4.00	....
TE-T	0.09	0.7	0.5	0.15	30.0	20.0	..	4.0	7.64	....	4.00	....
MT-1	0.08	1.0	1.0	....	30.0	20.0	5	6.0	1.00	2.00	4.00	0.5 V, 0.5 Zr, 0.5 U
MT-2	0.33	2.0	1.0	....	30.0	20.0	5	6.0	1.00	2.00	4.00	same
MT-3	0.33	2.0	1.0	....	30.0	20.0	5	6.0	1.00	2.00	4.00	same + 2 Ti
MT-4	0.34	2.0	1.0	....	30.0	20.0	5	5.0	1.00	2.00	4.00	....
MT-5	0.34	2.0	1.0	....	30.0	20.0	5	5.0	1.00	2.00	4.00	0.5 V
MT-6	0.34	2.0	1.0	....	30.0	20.0	5	5.0	1.00	2.00	4.00	15 V, 1.5 Ti
MT-7	0.34	2.0	1.0	....	30.0	20.0	5	5.0	1.00	2.00	4.00	....
MT-7	0.34	2.0	1.0	....	30.0	20.0	5	5.0	1.00	2.00	4.00	0.5 V, 1.5 Ti, 0.1 B
MT-8	0.33	2.0	1.0	0.15	31.0	21.0	..	4.0	2.1	....	4.00	....
MT-9	0.37	2.0	1.0	0.15	31.0	21.0	5	4.0	1.95	....	4.00	....
MT-10	0.37	2.0	1.0	0.15	30.0	20.0	5	4.0	1.70	0.92	4.00	....
MT-11	0.43	2.0	1.0	0.15	30.0	20.0	11	4.0	1.59	0.92	4.00	....
MT-11A	0.28	1.0	0.5	0.15	30.0	20.0	12	4.0	2.46	0.78	4.00	....
MT-12	0.16	1.0	0.5	0.15	30.0	20.0	12	4.0	6.35	....	4.00	....
MT-13	0.11	1.0	0.5	0.15	30.0	20.0	12	4.0	3.0	....	4.00	....
MT-14	0.11	1.0	0.5	0.15	30.0	20.0	12	4.0	2.77	1.29	4.00	....

TABLE III

Rupture Test Results at 1500° on Forged Bars

Alloy	Heat Treatment[1]	Aging Treatment[1]	Stress Psi	Hours to Fracture	Elong. Pct	R. A. Pct	Creep Rate Pct per hr	
							Total	Min.
TB	2200° WQ	50 hr 1500°	20,000	14.0	13.2	14.9	0.94	....
	2200° WQ	50 hr 1500°	20,000	11.0	15.8	14.1	1.43	....
	2250° WQ	50 hr 1500°	15,000	100.0	17.8	....	0.178	....
TE	2200° WQ	50 hr 1500°	20,000	15.5	19.8	30.0	1.27	....
	2200° WQ	50 hr 1500°	20,000	13.5	30.8	26.7	1.60	....
	2300° WQ	None	20,000	52.4	12.1	17.3	0.23	....
	2200° WQ	50 hr 1500°	15,000	213.0	20.2	....	0.093	....
	2300° WQ	None	15,000	380.0	17.2	27.3	0.045	....
TE-O	2200° WQ	50 hr 1500°	20,000	21.5	7.9	6.4	0.37	....
	2200° WQ	50 hr 1500°	20,000	13.8	35.9	20.9	2.82	....
TE-OA	2150° WQ	50 hr 1500°	20,000	7.5	29.2	29.6	3.90	....
	2150° WQ	50 hr 1500°	20,000	6.5	49.8	29.0	7.70	....
	2250° WQ	50 hr 1500°	20,000	9.0	18.1	17.2	2.01	....
	2250° WQ	50 hr 1500°	15,000	105.0	17.2	15.1	0.16	....
TE-OB	2200° WQ	50 hr 1500°	20,000	14.0	17.2	21.6	1.23	....
	2250° WQ	None	20,000	24.5	11.6	18.0	0.46	....
	2300° WQ	None	20,000	39.6	8.8	11.1	0.22	....
	2250° WQ	None	15,000	120.0	14.0	14.7	0.116	....
TE-OC	2200° WQ	50 hr 1500°	20,000	13.5	30.8	25.5	2.28	....
	2250° WQ	None	20,000	15.0	15.2	20.3	1.01	....
	2250° WQ	None	15,000	110.0	23.4	19.6	0.212	....
TE-T	2150° WQ	50 hr 1500°	20,000	6.0	36.2	24.5	6.04	....
	2250° WQ	50 hr 1500°	20,000	8.0	25.0	20.3	3.12	....
	2250° WQ	50 hr 1500°	15,000	36.0[2]	2.2	14.5	0.61	....
TE-C1	2200° WQ	50 hr 1500°	20,000	18.5	2.6	3.2	0.14	....
	2200° WQ	50 hr 1550°	20,000	4.3	19.8	27.0	4.65	....
	2200° WQ	None	20,000	11.5	18.4	19.7	1.60	....
SX	2200° WQ	50 hr 1500°	20,000	4.5	14.5	26.8	3.22	....
SY	2200° WQ	50 hr 1500°	20,000	6.0	6.6	4.8	1.10	....
SZ	2200° WQ	50 hr 1500°	20,000	17.0	19.8	18.2	1.17	....
	2200° WQ	50 hr 1500°	20,000	10.0	13.2	23.2	1.32	....
MT-2	2200° WQ	50 hr 1500°	20,000	11.0	18.3	41.5	1.66	....
	2200° WQ	None	20,000	13.0	27.6	47.5	2.12	....
	2000° WQ	None	20,000	6.5	30.6	42.4	4.70	....
MT-4	2200° WQ	50 hr 1500°	20,000	7.0	33.0	33.5	4.70	....
	2250° WQ	50 hr 1550°	20,000	13.0	21.0	27.2	1.62	....
	2250°, WQ	50 hr, 1500°	15,000	56.0	22.4	....	0.34	....
MT-5	2200°, WQ	50 hr, 1500°	20,000	9.0	13.2	28.0	1.47	....
	2250°, WQ	50 hr, 1550°	20,000	8.0	14.2	34.8	1.78	....
	2200°, WQ	50 hr, 1500°	15,000	27.0	28.2	23.5	1.05	....
MT-8	2200°, WQ	50 hr, 1500°	20,000	11.0	10.5	14.8	0.95	....
	2200°, WQ	None	20,000	8.0	16.1	11.6	2.01	....
	2200°, WQ	50 hr, 1500°	15,000	157.0	14.0	12.8	0.089	....
MT-9	2200°, WQ	None	20,000	27.0	11.7	8.0	0.43	....
	2200°, WQ	None	20,000	30.0	7.0	7.2	0.23	....
	2200°, WQ	50 hr, 1500°	20,000	16.0	7.9	7.6	0.49	....
MT-10	2100°, WQ	50 hr, 1500°	20,000	8.5	31.0	31.3	3.65	....
	2100°, WQ	None	20,000	7.0	23.6	22.8	3.37	....
	2100°, WQ	50 hr, 1500°	15,000	79.0	44.5	31.3	0.56	....
MT-11	2100°, WQ	50 hr, 1500°	20,000	20.0	21.4	22.5	1.07	....
	2100°, WQ	None	20,000	22.0	24.2	23.2	1.01	....
MT-11A	2150°, WQ	50 hr, 1500°	20,000	10.6	25.6	36.1	2.41	....
	2200°, WQ	None	20,000	20.0	37.2	25.7	1.86	....
	2300°, WQ	None	20,000	60.5	2.6	3.6	0.04	....
	2200°, WQ	None	15,000	119.0	21.8	....	0.183	....
	2300°, WQ	None	15,000	936.0	9.8	9.6	....	0.0065
MT-12	2150°, WQ	50 hr, 1500°	20,000	17.0	30.5	22.1	1.79	....
	2150°, WQ	None	20,000	24.5	16.6	15.2	0.68	....
	2200°, WQ	None	20,000	16.7[2]	16.2	13.4	0.97	....
	2300°, WQ	None	20,000	25.0	8.0	8.0	0.32	....
	2300°, WQ	None	20,000	24.3	16.5	10.0	0.68	....
	2300°, WQ	None	20,000	122.0[3]	15.9	14.7	0.13	....
	2150°, WQ	None	15,000	85.0	24.2	....	0.284	....
MT-13	2150°, WQ	50 hr, 1500°	20,000	10.5	26.5	30.0	2.52	....
	2200°, WQ	None	20,000	17.0	43.5	25.5	2.56	....
	2300°, WQ	None	20,000	31.0	18.5	14.0	0.60	....
	2200°, WQ	None	15,000	211.0	24.8	....	0.12	....
	2300°, WQ	None	15,000	210.0[2]	19.1	15.6	0.09	....
MT-14	2150°, WQ	None	20,000	31.5	23.3	15.7	0.74	....
	2300°, WQ	None	20,000	36.3[4]	31.5	22.0	0.87	....
	2300°, WQ	None	20,000	58.6	20.0	14.0	0.34	....
	2150°, WQ	None	15,000	116.0	25.1	....	0.23	....

[1] All temperatures in °F.
[2] Failed in fillet.
[3] Temperature 25°F high.
[4] Temperature 25°F low.

and creep tests, respectively, conducted on forged alloys.

Analysis Control—As table I shows, little or no difficulty was encountered in controlling the following elements: Ni, Cr, Mo, Co and W. Mn and Si were of no concern since these were present in small quantities, and in the case of Si, it was there as the residual quantity due to its presence in ferro alloys and in calcium-silicon metal which was used for deoxidation. That left only C, N_2, Ta and Cb to be concerned about.

The carbon content was readily controlled by adding it as a quantity of high carbon bearing ferro alloy, late in the heat. In most of these compositions, however, a minimum carbon content was desired.

Nitrogen is most commonly added as nitrogen bearing ferrochromium. The analytical results, obtained by vacuum fusion methods, show that for low carbon alloys (0.15 pct max) in virgin melts 90 to 100 pct of the calculated amount of nitrogen added will be recovered (this is not true of high carbon alloys as will be shown later in the report). The term "of the calculated amount" is used because to obtain 0.15 pct nitrogen 0.15 pct is added; however, such high chromium melts are known to show from 0.04 to 0.07 pct nitrogen due to the pickup from melting in air.

With remelt stock as a portion of the charge, calculations show only 50 to 75 pct nitrogen recovery from the scrap. This loss must be taken care of in the balance of the charge.

Addition of ferrocolumbium late in the heat, about 5 to 7 min prior to pouring, gave recoveries of from 95 to 100 pct. Even during remelting of columbium containing scrap, recoveries ran from 70 to 90 pct, mostly on the high side. Contrary to expectations, this element is not too difficult to control in induction furnace melting.

Tantalum is the most difficult to control and accordingly is added last. Two grades of tantalum scrap metal were tried. One grade, composed of bar ends measuring roughly 1 x 1 x ¼ in. was found to be more than half undissolved after as much as 10 min in a molten bath at 3100°F. At this rate, as the tantalum goes into solution, much of it is oxidized in the bath and lost as slag. As a result, efficiencies could not be readily calculated and recoveries were widely divergent from heat to heat. Later very thin radio and electronic tube scrap was used. In this form due to the large area present, the tantalum went into solution within a minute or two under similar conditions. Thus with the practice of adding it last, just prior to the addition of calcium silicon for deoxidation, recoveries

(CONTINUED ON PAGE 48)

TABLE II

Forging Temperatures* and Forgeability

Not Forgeable	Barely Forgeable	Fair	Good
TA	SY (2200°)	TB (2200°)	TE (2250°)
TD	MT-8 (2200°)	TC (2200°)	TF (2200°)
TG	MT-9 (2200°)	MT-2 (2200°)	SZ (2200°)
TAA	MT-10 (2100°)	MT-11 (2100°)	SX (2200°)
TE-C2		TE-C1 (2100°)	MT-4 (2200°)
MT-1		MT-11A (2100°)	MT-5 (2200°)
MT-3		MT-12 (2200°)	TE-O (2200°)
MT-6		MT-13 (2200°)	TE-OA (2200°)
MT-7		MT-14 (2200°)	TE-OB (2200°)
			TE-OC (2200°)
			TE-T (2200°)

*Figures in parentheses are the maximum forging temperatures used in °F.

TABLE IV

Creep Tests on Forged Alloys

(Creep tests at 1500° F)

Alloy	Heat Treatment[1]	Aging Treatment[1]	Load Psi	Total Creep		Minimum Creep Rate		Remarks
				Hours	Elong. in. per in.	Hours	Pct per hr	
TB	2200° WQ	50 hr 1500°	10,000	186	0.0614	0-186	0.033	Discontinued
	2200° WQ	50 hr 1500°	7,000	2015	0.0333	1370-2015	0.00190	Final
TE	2200° WQ	50 hr 1500°	10,000	221	0.0238	0-221	0.010	Discontinued
	2200° WQ	50 hr 1500°	7,000	2435	0.00248	1370-2435	0.00006	Final
	2200° WQ	50 hr 1500°	7,000	2360	0.00104	1400-2360	0.000014	Final
	2200° WQ	50 hr 1500°	8,500	2110	0.00133	1380-2110	0.000031	Final
	2300° WQ	None	8,500	2100	0.00095	1000-2100	0.000010	Final
TE-O	2200° WQ	50 hr 1500°	7,000	2100	0.00131	1000-2100	0.000006	Final
	2250° WQ	50 hr 1500°	8,500	2000	0.00115	1200-2000	0.000023	Final
TE-OB	2250° WQ	50 hr 1500°	7,000	600	0.00245	200-600	0.000214	Discontinued
SX	2200° WQ	50 hr 1500°	10,000	219	0.0520	0-219	0.024	Discontinued
SY	2200° WQ	50 hr 1500°	10,000	170	0.0168	Forge crack failure		
	2200° WQ	50 hr 1500°	7,000	270	0.0009	120-270	0.00032	Forge crack
SZ	2200° WQ	50 hr 1500°	10,000	171	0.1581	0-171	0.092	Discontinued
MT-11A	2300° WQ	None	8,500	2200	0.0020	1400-2200	0.00006	Final
	2300° WQ	None	10,000	1400	0.00030	500-1400	0.000001[2]	Final
MT-12	2150° WQ	None	7,000	500	0.00278	100-500	0.00032	Discontinued
MT-13	2200° WQ	None	7,000	2000	0.00205	1200-2000	0.000027	Final
MT-14	2150° WQ	None	7,000	1000	0.00178	500-1000	0.000065	Discontinued
MT-14	2300° WQ	None	8,500	1780	0.00450	Power interruptions		Discontinued

[1] All temperatures in °F.
[2] 1 in. gage length.

TABLE V

Composition of Cast Alloys Tested

Alloy	C	Mn	Si	N_2	Ni	Cr	Co	Mo	Ta	Cb	W	Others
30TA-1	0.30	0.7	1	0.12	30	20	....	6	4.07	5.25	....	....
24TA-1	0.24	0.7	1	0.12	30	20	....	6	4.07	5.25	....	....
17TA-1	0.17	0.7	1	0.122	30	20	....	6	4.07	5.25	....	....
24TD-1	0.24	0.7	1	0.15	30	20	18.0	6	2.75	4.20	....	....
22TD-1	0.22	0.7	1	0.15	30	20	18.0	6	2.75	4.20	....	....
18TD-1	0.18	0.7	1	0.15	30	20	18.0	6	2.75	4.20	....	....
18TG-1	0.18	0.7	1	0.168	30	20	....	4	1.97	4.04	4	....
15TG-1	0.15	0.7	1	0.149	30	20	....	4	1.97	4.04	4	....
15TG-2	0.15	0.7	1	....	30	20	....	4	4	4	4	....
17TG-2	0.17	0.7	1	....	30	20	....	4	4	4	4	....
13TEOB-1	0.13	0.7	1	0.15	30	20	....	4	3.51	....	4	....
42MT9-1	0.42	2.0	1	0.12	31	21	5.0	4	1.95	....	4	....

N-2 Series of Alloys

(Unless otherwise indicated the analyses are the same as the first listed)

Alloy	C	Mn	Si	N_2	Ni	Cr	Co	Mo	Ta	Cb	W	Others
19N-2	0.19	1.5	1.0	....	30	21	21	3.0	....	1.0	2.2	....
59N-2	0.59	....	....	....	....	....	....	....	....	....	....	....
61N-2	0.61	....	....	....	....	....	....	....	....	....	....	....
86N-2	0.86	....	....	0.063	....	....	....	....	....	....	....	....
87N-2	0.87	....	....	....	....	....	....	....	....	....	....	....
93N-2	0.93	....	....	0.069	....	....	....	....	....	....	....	....
104N-2	1.04	....	....	0.072	....	....	....	....	....	....	....	....
108N-2	1.08	....	....	....	....	....	....	....	....	....	....	....
111N-2	1.11	....	....	0.053	....	....	....	....	....	....	....	....
115N-2	1.15	....	....	....	....	....	....	....	....	....	....	....
151N-2	1.51	....	....	....	....	....	....	....	....	....	....	....
156N-2	1.56	....	....	0.052	....	....	....	....	....	....	....	....

P-2 Series of Alloys

Alloy	C	Mn	Si	N_2	Ni	Cr	Co	Mo	Ta	Cb	W	Others
30P-2	0.30	1.5	1.0	....	21	21	21	3.0	....	1.0	2.2	....
95P-2	0.95	....	....	....	....	....	....	....	....	....	....	....
116P-2	1.16	....	....	....	....	....	....	....	....	....	....	....
117P-2	1.17	....	....	....	....	....	....	....	....	....	....	....

S-2 and SA-2 Series of Alloys

Alloy	C	Mn	Si	N_2	Ni	Cr	Co	Mo	Ta	Cb	W	Others
40S-2	0.40	0.4	0.4	....	20	15	20	4.0	....	4.0	4.0	....
76S-2	0.76	....	....	....	....	15	....	....	....	....	....	....
80S-2	0.80	....	....	....	....	15	....	....	....	....	....	....
37SA-2	0.37	....	....	....	....	20	....	....	....	....	....	....
82SA-2	0.82	....	....	....	....	20	....	....	....	....	....	....

TABLE V—Continued

M-1 Series of Alloys

Alloy	C	Mn	Si	N_2	Ni	Cr	Co	Mo	Ta	Cb	W	Others
75M-1	0.75	1.0	0.5	0.15	30	20	12	4.0	2.0	1.0	4.0	....
107M-1	1.07	....	....	....	....	....	....	....	....	....	....	....
123M-1	1.23	....	....	....	....	....	....	....	....	....	....	....
125M-1	1.25	....	....	....	....	....	....	....	....	....	....	....
136M-1	1.36	....	....	....	....	....	....	....	....	....	....	....

NT-2 Series of Alloys

Alloy	C	Mn	Si	N_2	Ni	Cr	Co	Mo	Ta	Cb	W	Others
32NT-2	0.32	1.5	1.0	....	30	20	21	3.0	2.0	....	2.2	....
86NT-2	0.86	....	....	....	....	....	....	....	....	....	....	....
92NT-2	0.92	....	....	....	....	....	....	....	....	....	....	....
93NT-2	0.93	....	....	0.070	....	....	....	....	....	....	....	....
94NT-2	0.94	....	....	....	....	....	....	....	....	....	....	....
96NT-2	0.96	(mold casting temp. at 2250°)										
97NT-2	0.97	....	....	0.057	....	....	....	....	....	....	....	....
102NT-2	1.02	....	....	....	....	....	....	....	....	....	....	....
104NT-2	1.04	....	....	0.066	....	....	....	....	....	....	....	....
107NT-2	1.07	....	....	....	....	....	....	....	....	....	....	....
112NT-2	1.12	....	....	....	....	....	....	....	....	....	....	....

N-1 Series of Alloys

Alloy	C	Mn	Si	N_2	Ni	Cr	Co	Mo	Ta	Cb	W	Others
102N-1A	1.02	1.5	1.0	0.093	30	20	21	3.0	....	1.0	2.2	....
89N-1B	0.89	....	....	0.097	....	....	....	....	....	....	....	....
105N-1B	1.05	....	....	....	....	....	....	....	....	....	....	....
109N-1B	1.09	....	....	0.120	....	....	....	....	....	....	....	....
121N-1B	1.21	....	....	0.090	....	....	....	....	....	....	....	....
124N-1B	1.24	....	....	0.085	....	....	....	....	....	....	....	....
134N-1B	1.34	....	....	0.090	....	....	....	....	....	....	....	....
106N-1C	1.06	....	....	0.076	....	....	....	....	....	....	....	....
107N-1C	1.07	....	....	0.086	....	....	....	....	....	....	....	....
114N-1C	1.14	....	....	0.110	....	....	....	....	....	....	....	....
110N-1D	1.10	....	....	0.089	....	....	....	....	....	....	....	....
111N-1D	1.11	....	....	0.085	....	....	....	....	....	....	....	....
115N-1D	1.15	....	....	0.083	....	....	....	....	....	....	....	....
122N-1D	1.22	....	....	0.133	....	....	....	....	....	....	....	....
128N-1B	1.28	....	....	0.105	(cast into a room temp. mold)							

NT-1B Series of Alloys

Alloy	C	Mn	Si	N_2	Ni	Cr	Co	Mo	Ta	Cb	W	Others
90NT-1B	0.90	1.5	1.0	0.110	30	20	21	3.0	2.0	....	2.2	....
93NT-1B	0.93	....	....	0.101	....	....	....	....	....	....	....	....
94NT-1B	0.94	....	....	0.090	....	....	....	....	....	....	....	....
99NT-1B	0.99	....	....	0.071	....	....	....	....	....	....	....	....
101NT-1B	1.01	....	....	....	....	....	....	....	....	....	....	....
102NT-1B	1.02	....	....	0.081	....	....	....	....	....	....	....	....
103NT-1B	1.03	....	....	....	....	....	....	....	....	....	....	....
111NT-1B	1.11	....	....	0.112	....	....	....	....	....	....	....	....
115NT-1B	1.15	....	....	0.096	....	....	....	....	....	....	....	....
124NT-1B	1.24	....	....	0.097	....	....	....	....	....	....	....	....

(CONTINUED FROM PAGE 45)

of 65 to 75 pct were obtainable in virgin melts. Tantalum recoveries, however, ran from 10 to 30 pct in remelted scrap heats.

Because tantalum is so expensive and because elements with efficiencies considerably below 90 pct give extremely erratic recoveries, it was difficult to strike the desired analysis. A change in melting practice was required. This was accomplished finally by adding calcium silicon metal (25 to 30 g per 30 lb heat) just prior to and again immediately after the tantalum addition. When this was done, by adding the tantalum 2 to 3 min prior to pouring, recoveries of better than 90 pct were realized.

Cast Alloys

Ni-Cr-Co-Fe Base Alloys—All the test bars were prepared by the lost wax process using the silica investment prepared by the Austenal Laboratories. This investment, which is bonded by silica derived from tetra-ethyl-silicate, was the most satisfactory.

One inch gage length bars were cast for the rupture tests and 2-in. bars for creep test purposes (both gage lengths for the 0.250-in.diam bars).

Melting was done in a small rocking arc furnace containing a magnesia crucible. Casting was done under pressure of either helium or nitrogen.

The molds were preheated to 1850°F prior to pouring except for certain tests which were made to see the effect of both colder and hotter mold temperatures.

Analysis control, after preliminary checks had shown practically no loss of alloying elements, was confined only to nitrogen and carbon. The carbon monoxide atmosphere over the bath surface is sufficient to prevent oxidation of all but the most active elements such as titanium or aluminum.

All bars were radiographed prior to testing in an effort to keep down the time lost in testing defective bars.

Table V lists the total number of cast alloy compositions made. It will be noted that the first set of numbers indicates the carbon content in hundredths of one pct. The letter or letters following these numbers designate the particular combination of elements making up the base composition of the alloy. Using that one particular base then some one element in addition to carbon may be varied to form a series of alloys. The final number with or without the letter (following the hyphen) indicates whether nitrogen has been added to the alloy or not. Thus the number "-2" indicates that no nitrogen has been added to the alloy. The combination "-1A" tells that nitrogen has been added up to 0.08 pct, "-1B" means up to 0.15 pct, "-1C" up to 0.20 pct, and "-1D" means nitrogen up to 0.23 pct has been added to the alloy.

Thus the "P" base alloys are the N-155 type alloys but containing higher carbons. The "N" series base alloys are similar to the N-155 type alloy except that 30 instead of 20 pct nickel is used. The "NT" series is similar to the "N" series except that 2 pct Ta is used instead of 1 pct Cb.

Table VI, which will follow in a subsequent issue, lists the total results of stress rupture testing of the cast Ni-Cr-Co-Fe base alloys at both 1500° and 1600°F and at stresses running from 15,000 through 30,000 psi.

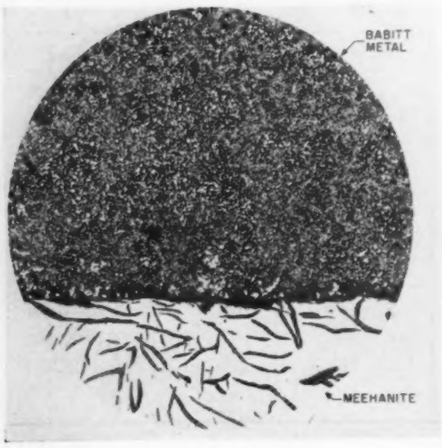
Table VII, which will follow in a subsequent issue, lists the results of creep tests conducted at 1500°F only for various stresses on cast Ni-Cr-Co-Fe base alloys.

In a subsequent issue, the author will continue his discussion of high temperature alloys.—Ed.

Meehanite Used for Babbitted Bearing Shells

While iron as a backing for engine bearing shells has been used extensively for many years, there have always been a number of disadvantages from both a design and application standpoint. Considering cast iron a weak material, such bearings were made with extra heavy and bulky sections with the result that size, shape and form of the bearings were anything but uniform or efficient.

With the development of Meehanite castings and the availability of their high strength properties, dense metal structure and uniformity of characteristics, it became possible to produce truly precision-made bearing shells, which in tests and in service have proved capable of withstanding greater punishment than steel-back shells using this same type of babbitt. A recently developed process for cleaning the bearing shells is equally responsible for their success. Known as the Kolene process it results in a chemically clean surface removing free graphite particles from the metal face and permitting a perfect bond, between the Meehanite shell and the babbitt metal. It has also been found that lead arsenic babbitt can be used successfully and at less cost.



ILLUSTRATION, left, shows the excellent bond obtained between the babbitt and the Meehanite backing; below, a typical Meehanite bearing shell indicating the light section which may be used.

Gage Checks Cylinder Blocks Automatically at 32 Points

A NEW measuring instrument of extreme precision for simultaneously gaging bore diameters of an automobile cylinder block at 32 points for "Go" and "No Go" has been developed. It performs the entire gaging job in less than 60 sec. This air gaging instrument, which weighs several thousand pounds and is about 4 ft wide, 8 ft long and 7 ft in height, accurately measures to 0.0001 in. It was built by the Sheffield Corp., Dayton, for the Buick Div. of General Motors.

Designed expressly as an integral part of the production line, the Sheffield multiple spindle Precisionaire shown in the accompanying photograph checks by air flow for diameter, taper and out-of-roundness of eight cylinder bores of an automobile engine block at four different points in each cylinder, and accurately classifies them to 0.0003 in.

The engine blocks are brought to the gage by the conveyor line, then checked and passed down the line to the next operation. The cycle begins with one block in loading position. As the starting button is depressed, loading arms pick up the block and advance it to the gaging position where two hydraulic plungers locate the block and hold it in place. As an additional precaution, a shot bolt enters the locating hole in the top of the block and insures proper location.

The eight cylinder bores are then entered by eight spindle assemblies which elevate automatically. Each assembly consists of four spindles that float independently to allow for tolerances in hole spacing. Upon reaching the limit of travel, the spindle automatically stops and can be manually rotated through 180° for out-of-round inspection. The spindles may be stopped at any point and rotated 180°, if so desired. In the event interference is encountered by any one of the sets of spindles, the machine will stop and a red light indicates the incorrect cylinder bore.

Thirty-two Precisionaire indicating tubes are grouped and located at eye level. Each of the eight spindle assemblies has four Precisionaire tubes to indicate its findings. A scale graduated in 0.0003 in. and marked off in selection sizes of numbers from 1 to 10 is located to the right of the right hand tube in each set.

As the engine block is being gaged, the floats instantaneously fall in the tubes to a position opposite a number on the scale. The movable tolerance slide is positioned to determine if all four floats are within the out-of-round and taper limits which are 0.0007 in. If so, the selection size is indicated by the number opposite the float in the right hand tube. This number is then manually stamped on the engine block directly beside the cylinder bore so classified. Stamping of the selection size of each bore is accomplished by a marking device mounted directly above each of the eight spindle assemblies. After all cylinder bores have been stamped, the spindle assemblies are retracted and the machine is ready to begin a new cycle. Hydraulically operated, electrically controlled and gaging by air flow, the multiple spindle Precisionaire will accomplish one complete cycle in less than 50 sec, thus checking at the rate of more than 60 engine blocks per hr.

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MOTOR block in gaging position with the eight spindle assemblies inside the bores. The dimensions checked at four points in each cylinder are indicated by the 32 floats on the panel above the block.

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Corrosion Resistance of Stainless Steels

THE stainless steels used in industry are those containing more than 12 pct chromium. Carbon is an objectionable element, in that it impairs the corrosion resistance. The carbon content, however, is sometimes especially increased, since articles made of stainless steels must have definite mechanical properties.

If one considers the use of such articles under corroding conditions, a general conclusion is that the corrosion resistance is determined by the properties of the surface layers. The body itself is of no importance for service in a corroding media, which is why surface rust-preventive coatings are widely used. These coatings, however, may have some essential defects, such as porosity, rapid abrasion and scaling resulting from a strained condition and insufficient adhesion to the base metal. Obviously it is desirable to develop coatings free from these defects.

For the stainless steels with increased carbon content, a decarburized surface layer might serve as a protective coating, which would meet the necessity of having high carbon content for proper structural qualities and still have good corrosion resistance. In other words, the core will function as a structural material, while the surface of the article will serve as a rust protective coating.

When a method of increasing the corrosion resistance has been developed it will be possible to enlarge the scope of application for a steel with carbon content not more than 0.12 pct, see table 1, since further decrease in carbon content in the surface layers would improve the corrosion resistance of the steel in question.

Imparting good corrosion resistance to stainless steel containing high carbon, will result in several advantages:

1. It will be possible to use cheap carbon ferrochrome instead of expensive low-carbon ferrochrome.

TABLE I

Composition of Steels Investigated

Heat	C	Mn	Si	P	S	Cr
689	0.09	0.41	0.53	0.022	0.031	13.35
EG2*	0.23	0.33	0.37	0.013	0.013	13.43
690	0.42	0.41	0.67	0.020	0.024	13.10
692	0.56	0.37	0.54	0.023	0.023	13.04
693	0.79	0.37	0.59	0.020	0.020	13.28
694	1.00	0.43	0.48	0.031	0.021	13.08

* Industrial melting.

TABLE II

Properties of Decarburizing Compounds

Decarburizing Agent	Dissociation Temperature at Atmospheric Pressure, °F	Melting Temp., °F
$MgCO_3$	1110 to 1200	5070
$CaCO_3$	1650	4660
$BaCO_3$	1920	5430

2. The oxidizing period during the melting of steel in the electric furnace is markedly reduced.

3. The steel melting process is considerably shortened and simplified.

The purpose of this investigation is to develop a thermo-chemical treatment which would permit the surface decarburization of chromium stainless steel with high carbon content in order to enhance the corrosion resistance.

The steels investigated, see table I, were melted in a 30 kg high frequency furnace (acid lining) and forged to a cross-section of 16 x 16 mm.

As may be seen from table I, the steels investigated contained about 13 pct Cr with various carbon contents, the low carbon steel 689 being used mostly for comparison.

Decarburizing Agents

The decarburizing agent may be a solid, liquid or a gas. In choosing the proper agent, the desire for a simple process which would not require the designing of new equipment, impracticable for the steel producing plant, was the primary consideration.

Liquid materials, such as melted soda (Na_2CO_3), saltpeter (KNO_3), etc., are active low melting decarburizing agents, but they were not used in the investigation.

Gaseous decarburizing agents have a wide commercial application. Hydrogen and dissociated ammonia are commonly used in the removal of carbon, oxygen and sulfur from materials magnetically soft. Decarburization in gaseous media of stainless steel articles, which are often inconvenient to handle, requires special equipment; but decarburization in hydrogen has some advantages, as it results in scale-free articles.

In this investigation solid decarburizing agents were used which had to meet the following requirements: (1) To avoid considerable scaling, the material should not be too active as an oxidizing agent; (2) Should have high melting temperature and should not melt or adhere to the surface of the article being treated in the range of the thermo-chemical treatment; (3) Should be readily crushed; (4) Dissociation pressure should be high within the range of the temperatures of the thermo-chemical treatment, and (5) Material should be readily available and inexpensive.

These requirements are met by the carbonates of the earth alkaline metals and by the mixtures of iron ore with chemically inert heat resisting oxides. Some properties of carbonates tested are shown in table II.

The decarburizing process in the carbonates and in the iron ore may be assumed to proceed as follows:

1. The process of heating involves the decomposition of carbonates, according to the reaction.

$$MgCO_3 \rightarrow MgO + CO_2$$

In a limited space free of carbon dioxide, equilibrium sets in at a definite partial pressure of carbon dioxide. At the temperatures and in the media tested, the carbon dioxide pressure exceeds the atmospheric pressure. The boxes used in the experiments, however, were not completely sealed therefore, the partial pressure corresponding to the equilibrium did not set in, but the

Results of decarburization tests on high carbon, 13 pct chromium steels, conducted by Russian investigators, with the twofold intention of (1) removing carbon from surface layers to obtain good corrosion resistance, and (2) retaining carbon in the core to preserve the strength of the steel, are described herein. In the United States these properties are normally obtained by increasing the nickel content of the stainless grades, as for example in AISI types 414 and 531.

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complete decomposition of the carbonate was not observed either.

2. At the interface of metal decarburizing agent and at a certain depth of penetration by the decarburizing gases the reaction proceeds between carbon in the solid solution and carbon dioxide.

$$C + SO_2 \rightarrow 2CO$$

Carbon monoxide formed escapes into the atmosphere. The combustion of carbon may be assumed to result directly from chrome carbides, but this process in high chromium steels proceeds less actively than in carbon steels. At the same time the process of iron oxidation follows the equations:

$$Fe + CO_2 \rightarrow FeO + CO$$
$$3FeO + CO_2 \rightarrow Fe_3O_4 + CO$$
$$2Fe_3O_4\ CO_2 \rightarrow 3Fe_2O_3 + CO$$

The iron oxides formed may react with the carbon in steel. This reaction may be rather active, provided the rate of carbon diffusion is sufficiently high.

The prevailing of any of the above processes is determined by the relation between the rates of carbon diffusion and oxidation. If the rate of carbon diffusion exceeds that of oxidation, the decarburization predominates. In support of this, the smaller depth of decarburization with highly oxidized samples, than with low-oxidized ones, has been observed.

Among the oxides present in the iron ore used in this work, ferric oxide amounted to 93 pct. To diminish the oxidizing effect, the ore powder was mixed with magnesia.

At the temperature of 600°C (1112°F) the iron oxide dissociates according to the relation

$$3Fe_2O_3 \rightarrow 2Fe_3O_4 + \tfrac{1}{2}\ O_2$$

The carbon in steel reacts both with the liberating oxygen and the oxygen of the air:

$$2C + O_2 \rightarrow 2CO$$

Carbon monoxide is oxidized by the oxygen of the ore into carbon dioxide:

$$2CO + O_2 \rightarrow 2CO_2$$

Carbon dioxide further carries oxygen from the ore to the carbon in steel:

$$C + CO_2 \rightarrow 2CO$$

This process may involve continuous regeneration of carbon dioxide, which is connected with the oxidation of carbon monoxide by the ore.

During the thermo-chemical treatment, special attention was drawn to the distribution of active decarburizing agents, which should be as uniform as possible, to obtain the same degree of decarburization on all sides. Equally important is the sealing of boxes, which should not be completely tight, as the reaction $C + CO_2 \rightarrow 2CO$ may proceed in the direction indicated by the arrow only under continuous removal of the reaction product, i.e., carbon oxide; otherwise, the system C — CO_2—CO will reach equilibrium. The carbon content at the surface of steel may become bal-

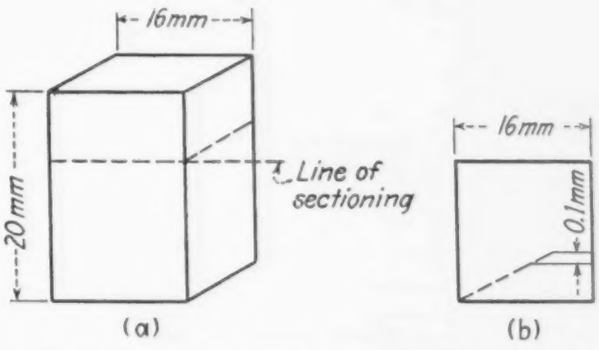


FIG. 1—(a) Method of sectioning samples; (b) method of hardness measurement by Vickers.

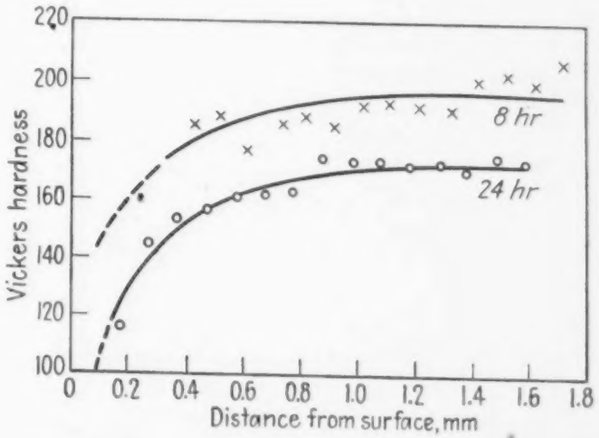


FIG. 2—Effect of exposition on hardness variation from the surface towards the core in steel 690, annealed in $MgCO_3$ at 1920°F.

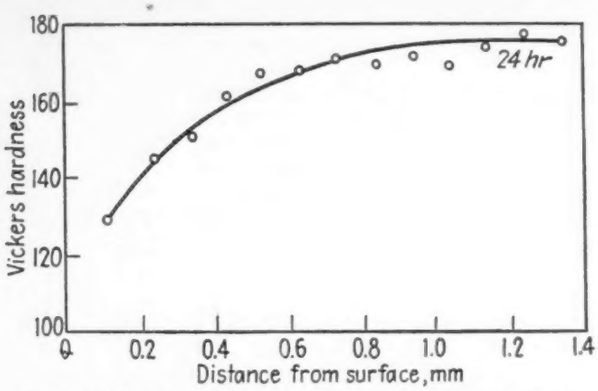


FIG. 3—Effect of annealing for 24 hr in the mixture of 15 pct ore and 85 pct MgO at 1920°F on hardness variation in steel 690 from surface to core.

anced in accordance with the given temperature, total pressure and relation Pco/Pco_2, and there will be no further decarburization. Unfortunately, as far as the alloy steel and solid decarburizer are concerned, the above is not liable to quantitative treatment.

At the same time, the boxes should be sufficiently tight so that the carbon dioxide resulting from the carbonate dissociation may not escape and cause the carbonate to dissociate completely; this in turn would cause a sudden drop in carbon dioxide concentration and might even stop the decarburizing reaction.

All the samples were annealed at various temperatures and for different time periods. It was desirable to establish the influence of exposition at the constant temperatures in uniform media on the decarburizing process.

The samples packed in the boxes to decarburize were placed into the furnace, heated, and cooled in the furnace. The temperatures taken for decarburization annealing were as follows: 1740°, 1830°, 1920° and 2010°F, the time of exposition being from 4 to 24 hr.

Hardness

After the samples had been subjected to the thermochemical treatment, they were sectioned in such a manner that the case was removed from the face surface only. The microsections were prepared on the sectioned side and etched with Villela reagent. The decarburized samples differed widely in the etching capacity of the core and of the decarburized layer.

The thickness of the decarburized layer was determined microscopically, and hardness was measured by the Vickers method from the surface towards the core. The method of sectioning and hardness measurements are shown graphically in fig. 1. The hardness of steel 689 after different heat treatments is listed in table III.

TABLE III

Hardness of Steel 689 After Different Heat Treatments In Sand

Heat Treatment	H_w
Annealing at 1920°F for 8 hr	180
Annealing at 1920°F for 8 hr	152
Double treatment: annealing 24 hr at 1920°F and air hardening from 1920°F	347
Double treatment: annealing 24 hr at 1920°F, air hardening from 1920°F and tempering at 1200°F	242
Annealing at 2010°F for 8 hr	149

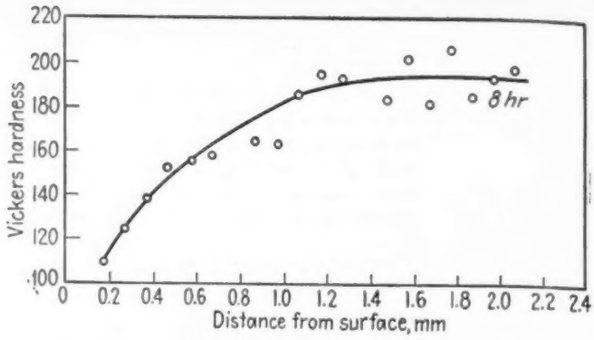


FIG. 4—Effect of annealing in $MgCO_3$ at 2010°F on hardness variation in steel EG2 from surface to core.

Hardness increases towards the core in accordance with the structural changes; the steel becomes pearlitic with the increased carbon content. According to the carbon content, the core may be pearlitic, hypoeutectoid, hypereutectoid-carbide or austenite-carbide.

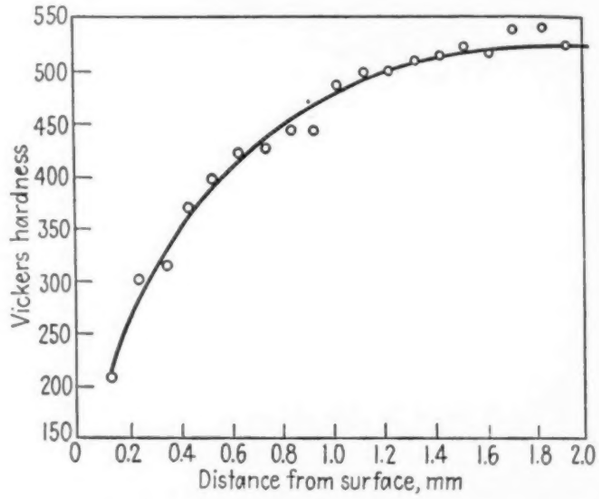


FIG. 5—Effect of hardening from 1920°F on hardness variation from surface to core in steel 690, annealed in $MgCO_3$, for 24 hr at 1920°F.

The hardness variation from the surface of steel 690 towards the core after treatment at 1920°F in $MgCO_3$ is shown graphically in fig. 2.

In the samples exposed for 24 hr, the hardness variation was more gradual than in samples exposed for 8 hr, which may be explained by the diffusion process being more complete. Hardness figures for the core and the surface differ by 40 to 70 on the Vickers scale.

Fig. 3 shows hardness variation from the surface towards the core in samples of steel 690 annealed for 24 hr at 1920°F in mixtures of iron ore and magnesia.

The annealing at 2010°F results in greater decarburization of the steel of EG2 type, compared to that at 1920°F. The hardness variation from the surface towards the core shown in fig. 4 indicates that the 8-hr treatment in $MgCO_3$ results in considerable decarburization. The decarburizing effect of other carbonates is also high but is inferior to that observed with $MgCO_3$.

The hardness variation is especially distinct after air hardening. That is quite evident, since after annealing, the core and surface layers are ferritic in structure, while after hardening the core is martensitic and

the surface ferritic (or partly ferritic, partly martensitic). Therefore, the difference in hardness figures increases and reaches 150 to 480 Vickers scale.

The above is clearly shown by the graphs in figs. 5, 6 and 7, which indicate hardness variation in steel 690 from the surface towards the core after air hardening. The data presented show that the thickness of the decarburized zone exceeds 1 mm. The most effective of the decarburizing agents used in the mixture of 15 pct ore and 85 pct MgO which imparts a hardness similar to that of chromium ferrite to the surface containing a small amount of martensite.

Consequently, 13 pct chromium steel may be decarburized to a considerable depth. It is interesting to note that even in steels containing austenite-carbide eutectic, the hardness of the surface layers approaches that of the ferrite-martensite structure.

Microstructure

After each of the successive heat treatments, all the sections were studied under the microscope before

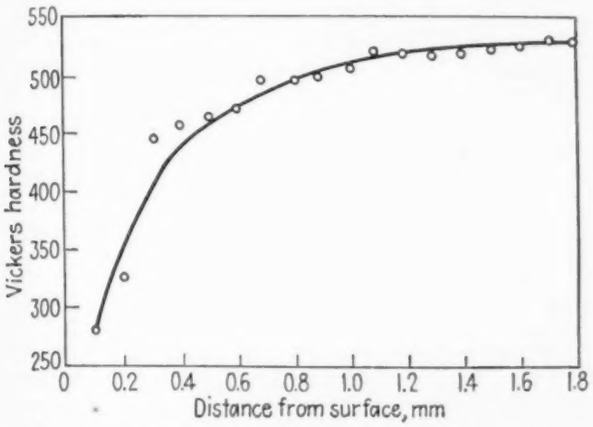


FIG. 6—Effect of hardening from 1920°F on hardness variation from surface to core in steel 690, annealed in $BaCO_3$ for 24 hr at 1920°F.

hardness was determined. The core and the surface, as well as the intermediate layer, were subjected to this examination.

The microstructure of steel 690 after decarburizing in $MgCO_3$ at 1920°F is shown in figures 8 and 9. The exposition for 16 hr results in a ferritic structure, with some quantities of carbides being found at the grain boundaries. The structure corresponds to that of steel 689. The exposition for 24 hr causes practically a ferritic structure.

Figs. 10 and 11 show the results of decarburizing in $CaCO_3$ and a mixture of 15 pct iron ore and 85 pct MgO, respectively, for 24 hr at 1920°F.

As indicated in the figures, the decarburizing process was rather complete, although it developed to a smaller extent in $CaCO_3$ than in the $MgCO_3$ or the ore.

Decarburizing in $MgCO_3$ at 2010°F has no advantages over that at 1920°F, but it causes more scaling at the surface of an article because of the higher temperature. The decarburizing at 1830°F is extremely slow and cannot meet the requirements put to this type of treatment.

The decarburization of steel 692 with 0.56 pct C and 13.04 pct Cr of the hypereutectoid carbide type results in almost pure ferrite at the surface after the exposition for 24 hr at 1920°F. Shorter expositions leave

TABLE IV

Mechanical Properties of Steels

Steel No.	Treatment	Prop. Limit, Kg per sq m	Tensile Strength, Kg per sq m	Elongation, Pct	Reduction Area, Pct	Menagee Impact Hardness, Kg-m per sq cm
689	Untreated samples*	50.75	70.8	24.75	70.5	6.0
690	Samples treated 24 hr at 1920°F	67.3	89.2	23.2	61.2	2.95
	Untreated samples	70.3	98.5	17.2	53.7	2.85
692	Samples treated 24 hr at 1920°F	69.5	91.0	15.5	48.0	2.6
	Untreated samples	69.3	94.0	19.2	49.5	2.45
694	Samples treated 24 hr at 1920°F	65.2	95.5	18.5	40.7	1.45
	Untreated samples	71.5	104.5	15.0	36.0	1.7

* The untreated samples are those hardened from 1920° F and tempered at 1200° F.

some amounts of pearlite.

After decarburization for 24 hr at 1920°F, steel 694, with austenite-carbide eutectic which contains 1 pct C and 13.08 pct Cr, also shows some ferritic structure on the surface. The intensity of the decarburizing process is much influenced by the carbon content in the 13 pct Cr steel.

T. Burglund[1] suggests that the amount of carbon burned out increases with the original carbon content. To verify this, one can examine the photomicrographs of steels of various carbon contents, decarburized under the same conditions of temperature, exposition time and media.

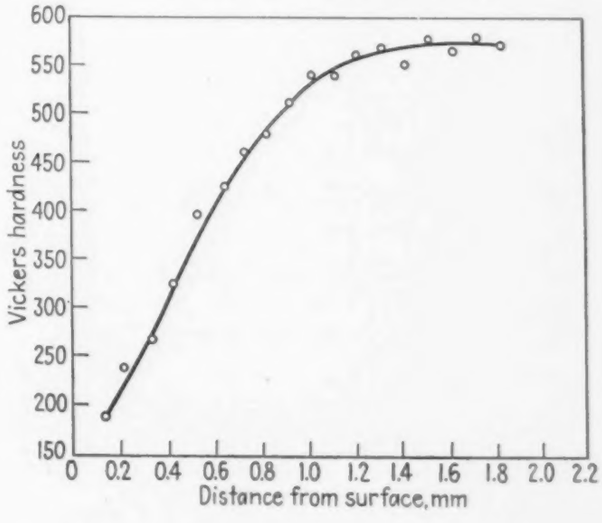
In fig. 12, which shows the surface structure of samples decarburized under similar conditions; it may be seen that the amount of pearlite in the surface layer rises with the increase in carbon content in the steel. It does not follow, however, that the decarburizing process is more active in steels with smaller carbon content.

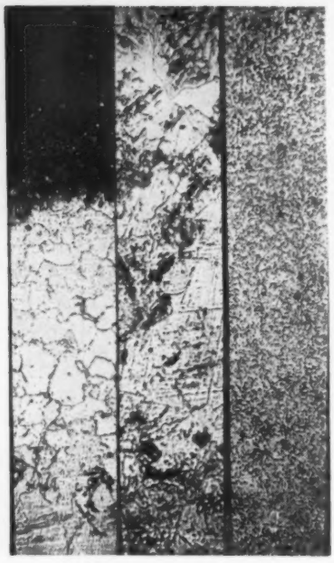
[1] *Yernkontorets Annaler*, 123, 1939, *No.* 2.

The steels with 0.23 pct C may lose 0.10 to 0.15 pct C to acquire ferrite-carbide structure, while the steel with 1 pct C must lose at least 0.5 pct-0.6 pct to have the structure shown in the figure.

It may be assumed that the difference in the extent

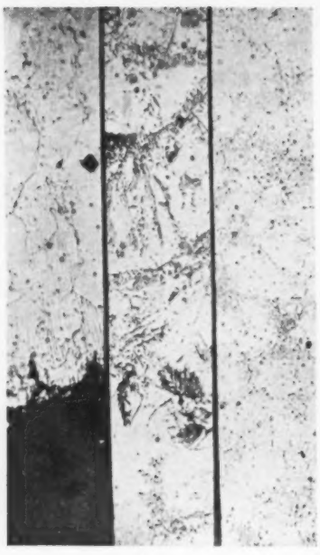
FIG. 7—Effect of hardening from 1920°F on hardness variation from surface to core in steel 690, annealed in mixture of 15 pct iron ore and 85 pct MgO.





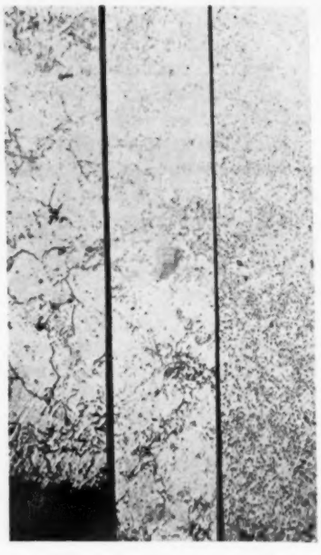
A B C

FIG. 8 — Microstructure of surface, intermediate layer and core of steel 690, annealed in $MgCO_3$ at 1920°F under exposition for 8 hr. A — decarburized surface, B — intermediate layer, C—core. 200X.



A B C

FIG. 9 — Microstructure of surface, intermediate layer and core of steel 690, annealed in $MgCO_3$ at 1920°F under exposition for 24 hr. A—Decarburized surface, B — intermediate layer, C—core. 200X.



A B C

FIG. 10—Microstructure of surface, intermediate layer and core of steel 690, annealed in $CaCO_3$ at 1920°F under exposition for 24 hr. A—decarburized surface, B — intermediate layer, C—core. 200X.

of decarburization decreases with the prolongation of exposition time, which means the practical possibility of obtaining ferrite-carbide structure in all the steels investigated.

The combustion of carbon in chromium steels with 0.23 and 0.42 pct C is active during the period of 8 to 12 hr. As the exposition time is prolonged, the combustion is considerably retarded because of the sudden drop in carbon concentration on the surface, though the total thickness of the decarburized layer increases. This is confirmed by the microstructure of steel 690.

In chromium steels of higher carbon content the active process of carbon combustion in the surface layers continues much longer.

TABLE V

Corrosion Resistance of Steel in 10 pct Solution of Nitric Acid

Steel	Decarburizing Treatment	Loss, g per sq m per hr
689 0.08 pct C	Non-decarburized samples	0.0505
690 0.42 pct C	Non-decarburized samples	0.219
690	Samples exposed to $MgCO_3$ for 24 hr at 1920°F	0.051
690	Samples exposed to 30 pct iron ore +70 pct MgO for 24 hr	0.039
693 0.79 pct C	Non-decarburized samples	2.474
693	Samples exposed to $MgCO_3$ for 24 hr at 1920°F	0.033
693	Samples exposed to 30 pct iron ore +70 pct MgO for 24 hr at 1920°F	0.060
694 1.0 pct C	Non-decarburized samples	4.374
694	Samples exposed to $MgCO_3$ for 24 hr at 1920°F	0.11
694	Samples exposed to 30 pct iron ore +70 pct MgO for 24 hr at 1920°F	0.093
EG2 0.23 pct C	Non-decarburized samples	0.10
EG2	Samples exposed to $MgCO_3$ for 24 hr at 1920°F	0.063
EG2	Samples exposed to 30 pct iron ore +70 pct MgO for 24 hr at 1920°F	0.0584

* Tested for 240 hr.

Finally, with the exposition for 24 hr in $MgCO_3$ at 1920°F all the steels show ferritic structure in the surface layers, irrespective of carbon content.

Mechanical Properties

To establish the effect of a long exposition at the decarburizing temperature on the mechanical properties, the blanks were exposed for 24 hr at 1920°F and tested after they were hardened at 1920°F and tempered at 1200°F.

The tests indicated that the mechanical properties are not influenced by a long exposition. The only change is in the proportional limit being decreased to a certain extent.

The tensile strength of the decarburized samples is inferior to untreated samples. The elongation and the reduction of area in most of the exposed steels is somewhat higher than in the unexposed ones. The impact hardness is not influenced by the exposition.

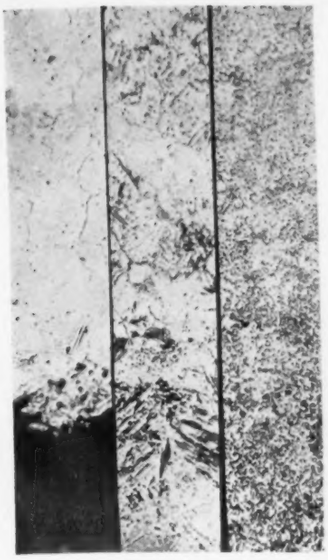
The mechanical properties are summed up in table IV.

Thus, there is no reason to fear that a prolonged exposition under the decarburizing conditions should reduce the quality of steel.

Hardness measurements on certain sections after annealing indicate that while the hardness changes gradually from the surface toward the core, there are some points with hardness values abnormally high the difference amounting to 550 Vickers scale. These points are generally observed under a prolonged exposition at 1920°F (24 hr).

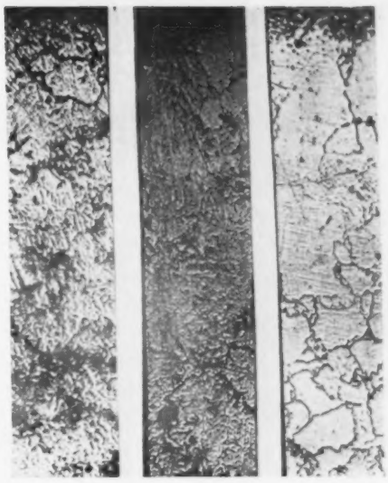
For example, hardness measurements on the decarburized samples of steel 690 from the surface towards the core over 0.1 mm gave the readings 225, 268, 200, 549 and 220. Meanwhile, the core hardness is 195. The hardness of 549 was determined at the point 1.2 mm from the surface.

To examine this unexpected variation, the sections were studied under the microscope. It was found out



A B C

FIG. 11—Microstructure of surface, intermediate layer and core of steel 690, annealed in mixture of 15 pct iron ore and 85 pct MgO at 1920°F under exposition for 24 hr. A—Decarburized surface, B—intermediate layer, C—core. 200X.



1% C 0.56% C 0.42% C

FIG. 12—Microstructure of surface layer of samples decarburized under similar conditions as dependent upon the carbon content in steel at exposition for 16 hr. 200X.

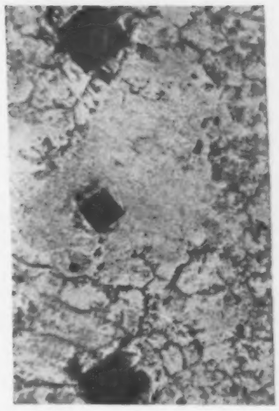


FIG. 13—Microstructure of steel 690 showing imprint of Vickers pyramid. 50X.

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that the increased hardness was inherent to the component, other than the basic structure, which covers a considerable part of the field. It may be seen from fig. 13 that a smaller imprint of the Vickers pyramid is in the larger area of the brighter surface, which, unlike the core, is not crossed by the grain boundaries. This suggests that the brighter structure component is a new phase precipitated at decarburizing, or coagulated from fine carbides.

The samples for the corrosion tests were decarburized for 24 hr at 1920°F in $MgCO_3$ and in the mixture of 30 pct iron ore with magnesia. After decarburizing, the scale was carefully removed. The decarburizing and blank samples were hardened from 1920°F in the air and tempered at 1200°F.

The corrosion tests were made by continuous immersion in 10 pct solution of nitric acid. The results are shown in fig. 14 and in table V. From these it may be concluded that the 13 pct chromium steels show the corrosion resistance similar to that of the steel 689 irrespective of the carbon content.

Conclusions

The object of this investigation was to search for a possibility of increasing the corrosion resistance of high carbon steels by treating them with solid decarburizing agents, chemically active. The results of the experiments made may be summarized as follows:

1. The chemically active solid decarburizers may be carbonates of earth alkaline metals or mixtures of oxides chemically inert (for instance, magnesia) and different amounts of iron ore.

2. $MgCO_3$ proved to be the most active of the carbonates tested.

3. The temperature and duration of the decarburizing process should be chosen according to the carbon content. The exposition for 12 to 16 hr is sufficient for steels containing up to 0.42 pct C and about 13 pct Cr. The steels of higher carbon content require a decarburizing time not less than 24 hr. The best suited temperature is 1920°F.

4. The mechanical properties of steels are not influenced by a prolonged exposition under the decarburizing conditions.

5. It was shown by the test in 10 pct nitric acid that the corrosion resistance of chromium steel is highly increased by the treatment proposed, reaching the properties similar to those of steel of 0.12 pct carbon content.

6. By means of the proposed method of treatment it is possible to produce articles of stainless steel possessing high corrosion resistance, as well as the strength required.

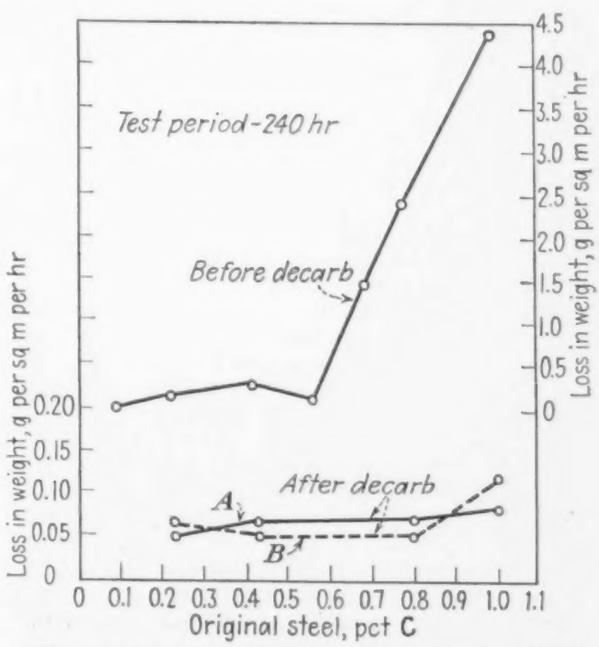


FIG. 14—Corrosion resistance of steels investigated in 10 pct HNO_3 before and after decarburization. Curve A—30 pct iron ore plus 70 pct MgO used; curve B—$MgCO_3$ used.

Braille Instruments

Vernier calipers and height gages, and micrometers reading to 0.0001 in., are now available with special Braille markings for use by blind inspectors. Developed in Britain by two prominent gage manufacturers as an aid to the rehabilitation of war wounded, these instruments were first described in the Production and Engineering Bulletin published by the British Ministry of Labor and National Service.

FIG. 1—By means of this specially designed vernier height gage, blind inspectors can obtain exact measurements without any fear of error. The adjustable jaw slides on the beam and can be fixed at any point; the micrometer head also slides and is located by a pawl engaging inch slots.

MUCH latent ability of blind persons was revealed during the war years, when it was demonstrated that the blind can do many jobs from which they had hitherto been excluded. One very good field of activity in the metal trades has been inspection work, at which they have proved themselves to be both quick and accurate.

As the sightless cannot see to read adjustable instruments carrying scales, the more or less general rule has been for them to use fixed gages such as snap, ring, or plug gages. One move to overcome this limitation was the introduction of a comparator type instrument in which an audible signalling device was incorporated in place of the usual pointer or colored signal lamps. Three different notes of a bell or buzzer sounded high, medium, or low, according to whether the workpiece under test was above the high limit, within the limits, or below the low limit.

There remained, however, obvious difficulties in the way of the use by the blind of micrometers and vernier height gages. This was unfortunate in view of the general applicability of these instruments, as jobs frequently occur outside the scope of the fixed gages. Moreover, it is often necessary for the inspector to be in a position to say not merely that a part is over or under size, but to give an exact statement of the deviation.

This problem has been given particular attention in Britain by the National Institute for the Blind, and the Ministry of Labor and National Service, and as a result two prominent British gage manufacturers have produced highly ingenious and extremely accurate instruments. One of these is the British N.S.F. Co., Ltd., Keighley, Yorks., which has introduced a 10-in. height gage and a 10-in. vernier caliper, fig. 1; the other is Messrs. Moore & Wright, Sheffield. who are manufacturing a Braille micrometer, fig. 2.

The height gage and vernier caliper are of a direct reading type, and although intended for the use of the blind, are so much easier to use than the standard vernier that they may well become popular with sighted workers. Increments of 1 in. are obtained by a spring loaded pawl locating in slots accurately cut in the edge of the beam. The 1-in. intervals are subdivided into increments of 0.100 in. by means of ten slip gages hardened and accurately lapped to size. These are pivoted to the saddle, and spring loaded so that they may be swung into line with the micrometer spindle as desired. Each tenth can be subdivided into increments of 0.025 in. by each complete turn of the micrometer screw, to which is attached a notched disk. This disk has 25 peripheral notches into which a spring pawl can click, thus enabling the micrometer screw to be moved in increments of 0.001 in.

To facilitate rapid settings, one of the 25 notches on this disk is made sufficiently deep to locate positively with a spring-loaded pawl so that it will be locked after each full revolution. This gives a definite indication of each full revolution of the micrometer screw. A knurled stem permits the pawl to be lifted to free the disk for additional turns.

When making a measurement the slip gages are swung out of line with the micrometer screw, which is turned back to its outer limit. The movable jaw or saddle is then closed until the workpiece is accepted with the conventional feel or degree of touch. The

Aid Blind Inspectors

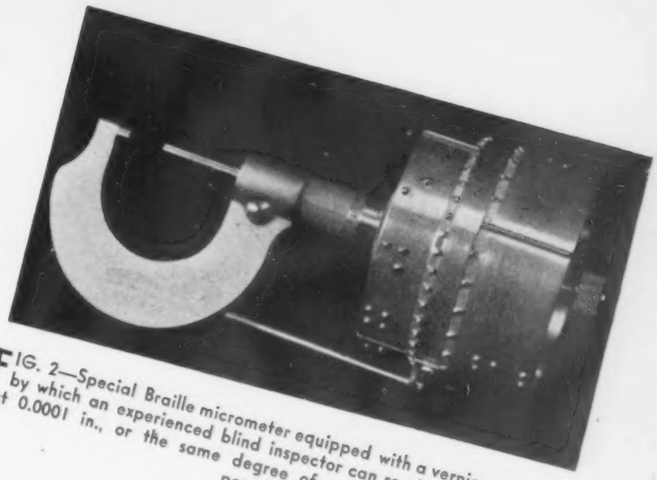


FIG. 2—Special Braille micrometer equipped with a vernier scale by which an experienced blind inspector can read to the nearest 0.0001 in., or the same degree of accuracy as a sighted person.

micrometer head is now moved down to bring the spindle into contact with the movable jaw, and immediately moved up again until its pawl enters the first slot in the beam that it encounters, whereupon it is locked by a thumb screw. Next, as many slip gages as possible are swung into the space between the movable jaw and the micrometer spindle, each one being counted as it enters. Any remaining gap is closed by rotation of the micrometer screw, the number of complete rotations and the number of 0.001-in. increments needed to do this being counted.

The following example may make simpler this somewhat complicated-sounding procedure:

Number of beam notches still exposed	6
Number of slips swung down	5
Number of complete revolutions of micrometer disk	2
Number of clicks emitted by micrometer disk	23

The actual height of the component will then be 10 in. less the sum of the distance represented by the above figures, that is:

$$10 - (6 + 0.5 + 0.050 + 0.023) = 10 - 6.573 = 3.427 \text{ in.}$$

The same procedure is followed with either the vernier caliper or the height gage, and it has been found that blind operators familiar with the normal vernier type of gage are able to learn to use these instruments successfully within an hour, without there being any doubt as to the accuracy of the reading usually associated with vernier instruments.

In the case of the micrometer, a series of three drums are attached to the spindle. The zero drum, which does not rotate, is placed between the other two and is held by a sliding rod to the frame of the instrument. The outer drum corresponds to the thousandths of an inch, and the inner one records the steps of 1/40-in. By means of internal planetary gears the inner drum is geared to the outer so that each time the outer drum is given a complete revolution, which moves the spindle 0.025 in., the second drum is moved from one graduation to the next.

Complete revolutions of the thimble (40ths of an inch) are thus read on the inner drum against the fixed zero, while partial revolutions, in terms of 0.001 in., are indicated by the outer drum.

In making a setting the anvils are closed on the work. The blind worker then reads by touch which graduation on the inner drum was the last to be in line with the zero mark; and which outer drum graduation is in line with the fixed zero mark.

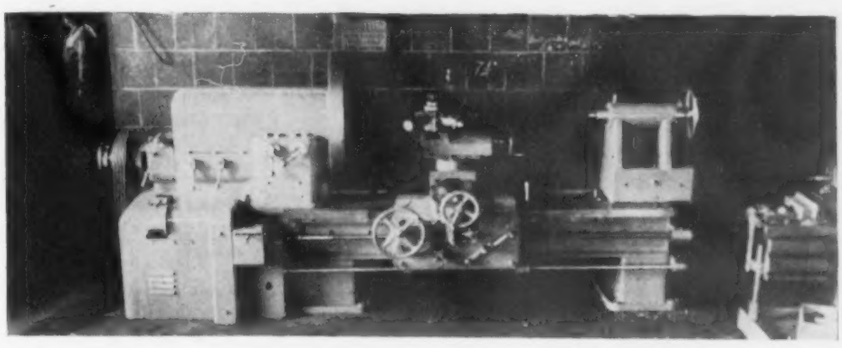
Similarly if it is desired to set the instrument to a particular dimension, the outer or thimble drum is rotated until the inner drum graduation, representing the number of 40ths, is in line with the zero mark; and then the correct outer drum graduation, representing the balance in thousandths, is moved into line with the zero mark.

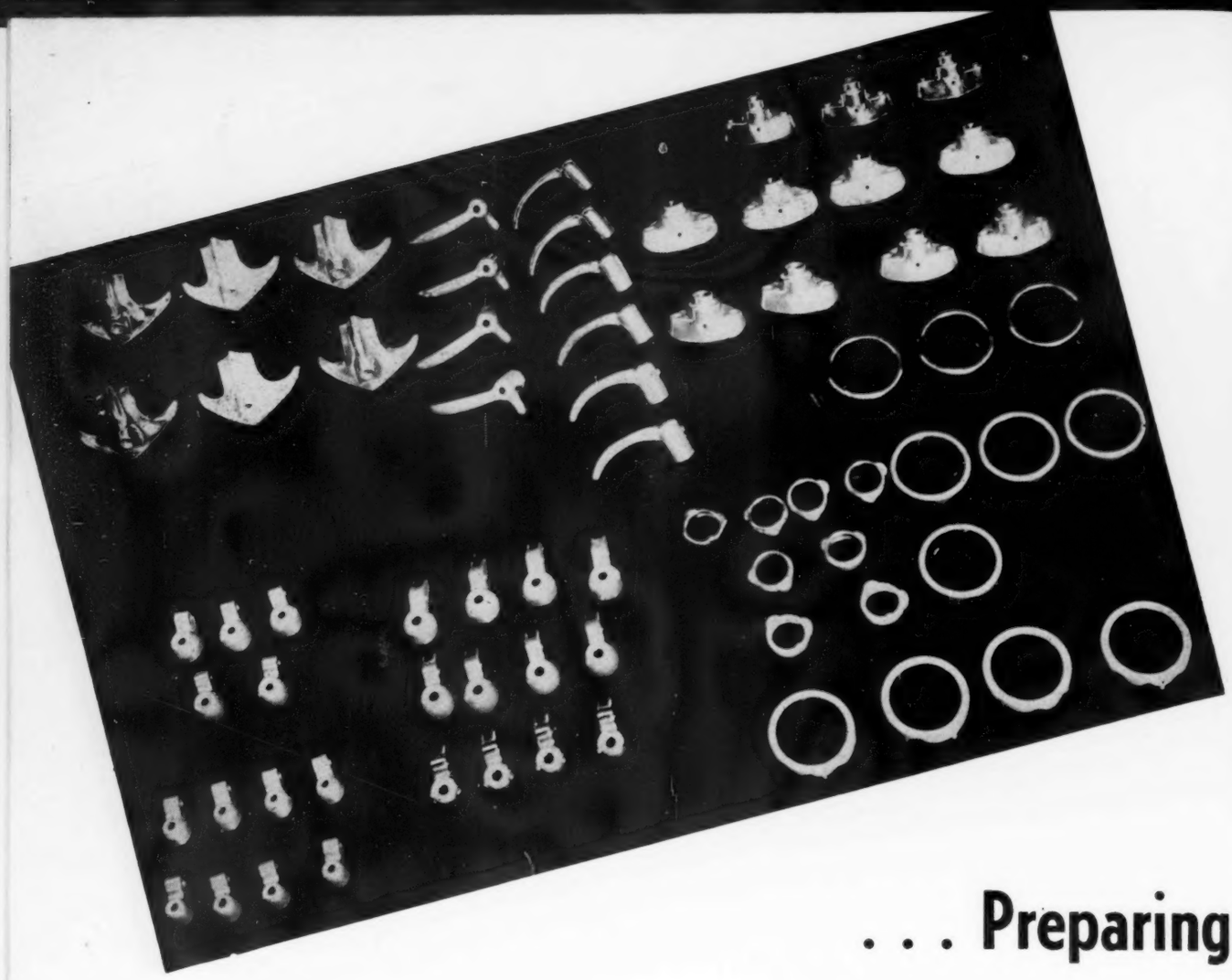
In addition to the zero graduation, further raised markings which constitute a vernier scale, are borne by the central fixed drum. In cooperation with the outer drum graduations they give readings to 0.0002 in., and a careful operator can easily read this scale to an accuracy of 0.0001 in.

Raised dots are employed to mark the graduations, with raised strokes to mark off groups of dots. Combined with Braille figures, this has been found ideal for reading by blind inspectors. The drums are made of light alloy and do not add appreciably to the overall weight of the standard micrometer. They are available as units for converting existing micrometers to Braille instruments.

Lathe From Salvaged Material

FACED with the impossibility of obtaining new equipment, due to war conditions, engineers at the Waite Amulet Mine, Ltd., Canada, designed and built the lathe shown in the accompanying illustration entirely from salvaged material. The machine has a 48-in. swing, is 72 in. between centers, and 14 ft overall length. With the exception of the machined parts, it was constructed entirely by welding, using a 300 amp arc welder, according to the Hobart Arc Welding News.





. . . Preparing

Production line polishing, buffing and tumbling of zinc alloy die castings preparatory to plating in one of the largest die casting plants in the country is described herein. Use of conveyors and fixtures to expedite operations is also covered in detail.

POLISHING and buffing operations at the Woodstock, Ill., plant of the Die Casting Div. of Electric Auto-Lite Co., represents one of the largest operations of its kind in any single plant. The productive capacity of this plant is 70 tons daily of a wide variety of die castings.

It is largely because zinc die castings are readily produced in the shapes required and with relatively smooth surfaces that such castings find extensive use where high grade plating is to be done. In automobiles, for example, zinc die castings are chosen for hundreds of parts serving both utility and decorative functions. But, before satisfactory plating can be done, a great deal of preparatory work is essential even though these parts are cast with what is termed a "hardware finish" of extreme smoothness. Some typical small zinc die castings, which are prepared for plating by Roto finishing, are shown in fig. 1.

Although some surfaces, especially along parting lines, have to be polished, others are cast so smooth parts and any that are not properly buffed are returned on the lower side of the belt to the operator responsible. Castings that pass buffing inspection are removed from the belt near the station where they are to be racked for plating.

After casting, removal of flash and the necessary minor machining, as described in a prior article,[1] the parts are transferred to polishing installations by chain conveyor or in tote boxes on trucks. Most polishing is performed either on belt sanders or on canvas wheels to which abrasive is glued, some parts requiring both types of equipment. The abrasive grain used ranges from 50 to 250 mesh.

In all polishing, the work is held and guided by hand, chiefly because surfaces are of irregular shape and the work must be shifted constantly in reference to the wheel or belt. Extensive use is made, however, of belts that run, at one end, over soft buffs. These permit the belt to conform in some degree to the shape of the surfaces being ground as the casting is pressed against the belt. Use is made, too, of narrow belts

[1] *In a preceding article, published in* THE IRON AGE, *May 9, 1946, the author described the equipment and procedures employed in producing 70 tons daily of zinc and aluminum die castings. The third and concluding article to be published shortly, will describe production line copper-nickel-chromium plating of die castings at the Die Casting Div. of Electric Auto-Lite Co., Woodstock, Ill., the world's largest single plant devoted exclusively to die casting.—Ed.*

LEFT

FIG. 1—Typical small zinc die castings which are prepared for plating by Roto tumbling, eliminating hand buffing.

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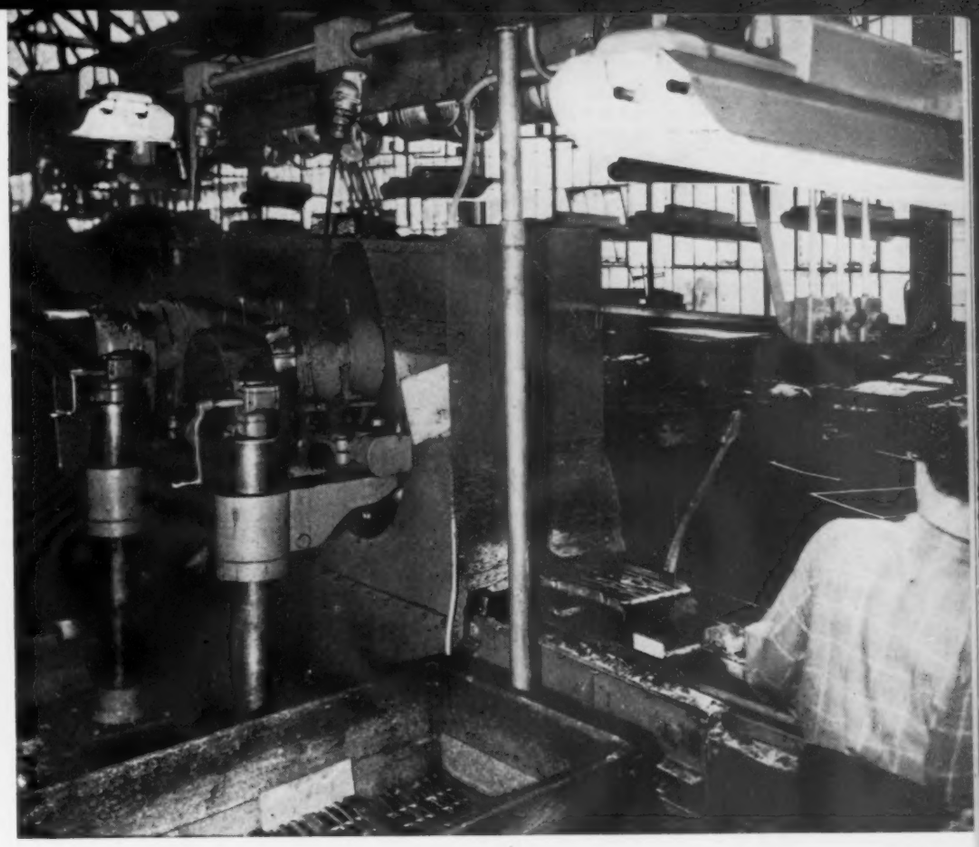
RIGHT

FIG. 2—Unloading a straight-line automatic buffer. Adjustable buffing heads are visible to the left. Castings are buffed in fixtures.



Die Castings for Plating

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By HERBERT CHASE

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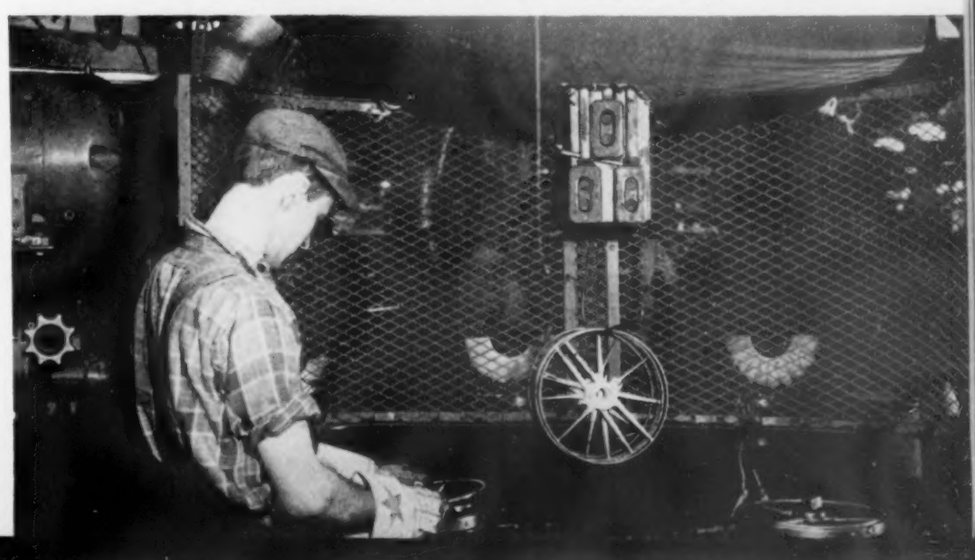
that run over small pullies one of which is at the end of a radius arm. This makes it possible to grind in recesses, as between the spokes of a wheel or horn ring, that are difficult to reach otherwise.

Actually, polishing is a fine grinding operation and should not be confused with buffing which follows it. In buffing, the fine scratches left in polishing are eliminated and a high luster is produced. Buffing is done with soft muslin wheels to which a somewhat greasy stick compound containing tripoli or equivalent fine abrasive is applied. Although much buffing is done with the castings guided by hand against the buff, many parts lend themselves to machine buffing, in which the part is held in fixtures, as in fig. 2. These sometimes rotate and sometimes are advanced against the buff without rotation.

Much of the hand-held buffing and some done on machines is accomplished along each side of a belt conveyor that extends almost half the length of a building. Some small castings are also polished along this line. Most parts are taken from tote boxes and, after buffing, are placed on the belt conveyor which advances them toward the plating installation. On the way, inspectors examine the parts and any that are not properly buffed are returned on the lower side of the belt to the operator responsible. Castings that pass buffing inspection are removed from the belt near the station where they are to be racked for plating.

Several types of buffing machines (besides the common forms of jacks having a spindle with a wheel at each end) are employed. The simplest of these uses a fixture arranged to rotate slowly as the work is fed against the buffing wheel, as in fig. 3. This form is suited for circular parts, such as horn rings. One type of fixture holds several rings while their peripheries are buffed against a wide wheel. Another holds a

FIG. 3—Acme dial-type automatic buffer for circular work. The fixtures rotate about their own axes as they advance under the buffer.



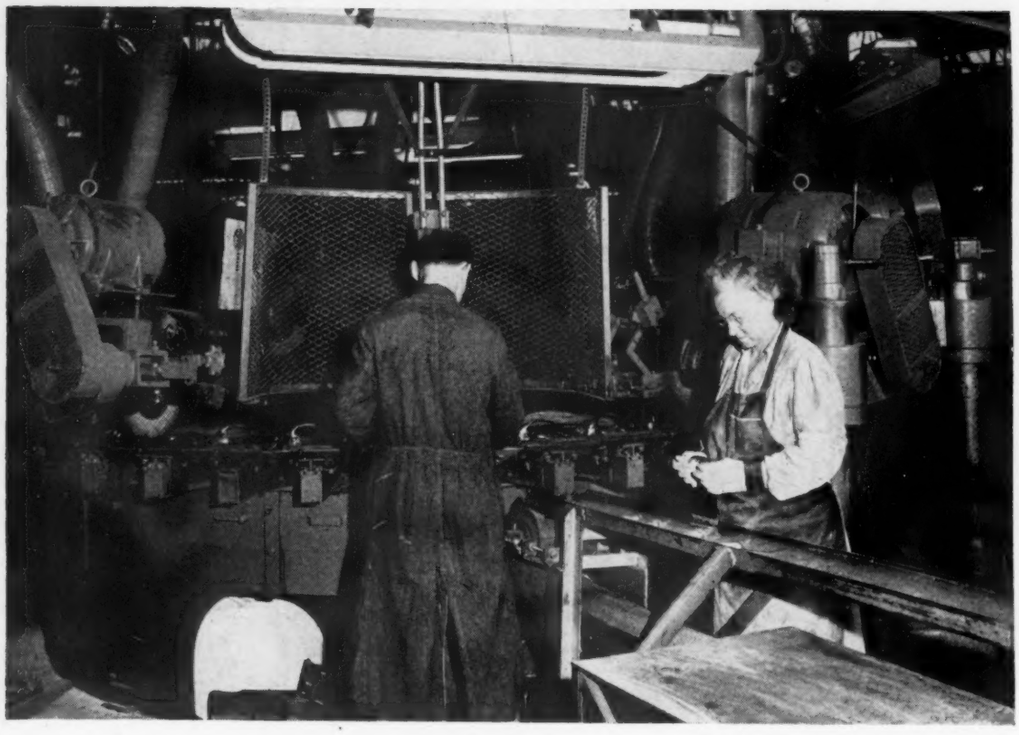
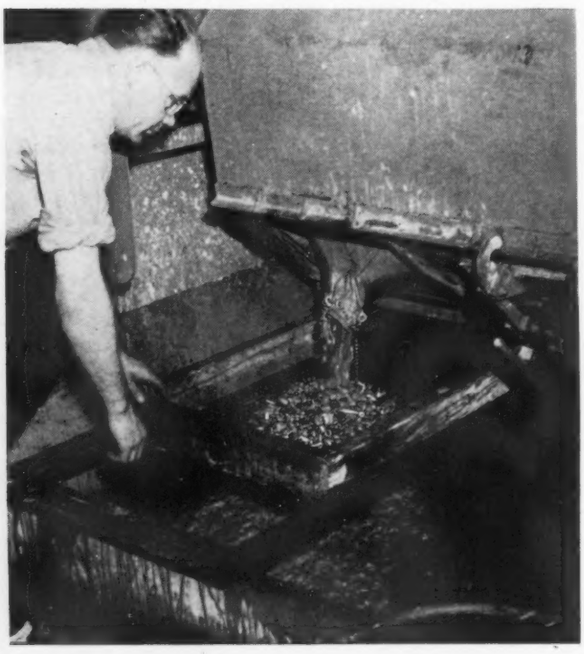


FIG. 4 — Circular track automatic buffing machine for hardware castings such as door handles. The fixtures are rocked by cams to bring all surfaces under the buffing wheel. One operator loads and unloads the machine.

single ring while its faces and spokes are buffed. Fixtures of the latter type are used in pairs, one being unloaded and reloaded while the other is swung under the buff.

For castings such as instrument panels, having mostly fairly flat surfaces, two forms of straight line polishing machines are employed. In both, the work is placed in fixtures that are advanced under several buffing wheels by a chain. In the simpler machine, the fixtures travel along a track under six wheels, each set to buff one portion of the surface.

FIG. 5—Unloading castings from a tumbling barrel in which the castings have undergone Roto finishing, a wet tumbling in limestone chips with special abrasives and polishing compounds.



Usually, when the casting reaches the unloading position, it is completely buffed but, in some cases, areas which the wheels of the machine do not reach are subsequently hand buffed. Different holding fixtures, usually having a wood base partly covered by metal, are required for each design of casting and the buffing heads have to be reset to buff all surfaces.

The second form of straight line machine is similar but can handle deeper castings having side faces that would not be reached on the simpler machine. This is accomplished by mounting the fixtures so that they are rocked about a longitudinal pivot as they are advanced. Rocking is accomplished by cams and the corresponding buffing heads are pressed down by springs that keep the wheels, which are set at different heights, against the work.

In the straight line machines, the buffing heads are placed along one side and a screen enclosure along the aisle side. Exhaust ducts below the machines create a down draft to carry off particles loosened from wheels and castings. All wheels are fed with compound from sticks. The stick feed is by a rod and hand lever linkage on the six-wheel machine and by automatic devices on the 11-wheel machine.

Each of these machines has a conveyor to return the fixtures to the loading end where an operator puts the castings into the fixtures and places them on the chain. At the opposite end, castings are unloaded and placed in tote boxes for shifting to the area where racking for plating is done. By using corrugated board or paper between castings in the tote boxes marring is avoided.

For certain castings of generally circular form, such as bezzles, a circular table or dial type of buffing machine is provided. This has eight stations of which one is for loading, one for unloading and six for buffing. An Acme head is at each buffing station and has its wheel set to buff a particular portion of the cast-

ing's surface. The table is indexed automatically and only loading and unloading has to be done by hand, the fixtures remaining on the table.

In the fourth type of automatic buffer, used entirely for door handles, there is a chain arranged to move continuously around a circular track as shown in fig. 4. This chain advances a series of oscillating fixtures that remain on the chain and are rocked by cams along the track so as to present an appropriate surface of the casting to each of ten wheels. The latter are on Acme heads with automatic feed of stick compound.

Operation is by one man who does both loading and unloading at the rate of 1800 pieces an hour. With a pace so rapid, the operator does not have time to place buffed parts in tote boxes but drops them on a short belt conveyor that carries them to a man who inspects the buffing and places the handles in tote boxes.

For small die castings, either not adapted for automatic buffing or not needed in quantities sufficient to warrant such a setup, tumbling of the so-called "Roto" type is now successfully employed and is understood to yield a better finish than ball burnishing and without the pitting that ball burnishing sometimes yields. This job is done wet, in wood lined metal barrels 32 in. in diam and 45 in. long. These octagonal barrels turn at only 26 rpm and produce more of a sloshing than a tumbling action such as would involve throwing the castings about and marring their surfaces. Castings remain submerged in the tumbling media.

A normal barrel charge involves 500 lb of limestone chips, from 100 to 3000 castings, depending on size, and Sturgis No. 100 rough "grinding" compound which contains a fine abrasive that aids the polishing action besides keeping the chips from glazing. The chips are small enough to enter recesses but not to lodge in them or in holes. After the charge is in place, water to cover the charge and rinse 3 to 6 in. above it is added before the barrel is sealed. After running 9 hr, the water is drained off, the grinding compound washed out and 5 lb of No. 203 Sturgis polishing compound is added. Then, after another 3 hr, the charge is ready for removal by dumping slowly onto a screen, fig. 5, that separates the castings from the chips and lets the water and compound drain off while parts are hosed. A canvas tube is attached to the barrel outlet to prevent the parts from coming out with a rush that will mar them. Parts that are too rough to be tumble burnished in reasonable time are given a "Butler" buff on a wheel with heavy abrasive compound before tumbling.

Tumbling does not yield a bright, but rather a somewhat grayish luster and a surface of extreme smoothness that takes a bright plate well. The final plated finish is a close approximation to that resulting on parts that are wheel buffed and, of course, requires much less labor, also reaching into corners where buffing would be difficult.

Buffing of radiator grille castings, some of which are quite large and have surfaces with pronounced curvature, involves some special problems. Areas to be buffed are large and require high pressures between buff and wheel. In consequence, most such work is done on four special Acme machines (fig. 6). Each of these has two wheels and a reciprocating table that is also given a rocking motion such as to bring all major surfaces of the castings under the buffs. The latter are fed automatically with stick compound and are

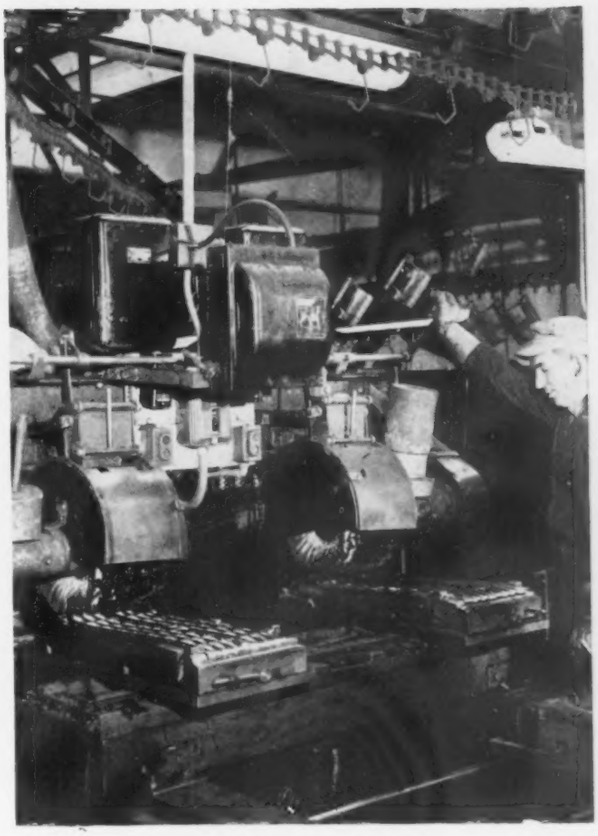


FIG. 6—Automatic machines for buffing grille castings two at a time. The fixtures are oscillated under the wheels.

wide enough to cover a considerable area as the castings are moved back and forth under the wheels. Castings are fastened to metal-faced wooden fixtures that are bolted to the table. If any surfaces that require bright plate are not buffed in this operation, some touchup buffing is done by hand on ordinary buffing jacks but these surfaces are small in comparison with the major surfaces.

Grille buffing is done in a building adjacent to one of the two large plating installations. Castings come from the polishing setup in building 32 served by an overhead chain conveyor.

After buffing, castings are racked for plating as soon as possible so as to avoid any chance of forming an oxide film before the castings go into the cleaning that immediately precedes plating. Any castings that are unusually dirty or greasy go through standard degreasing machines before they enter the alkaline cleaner. A large proportion, however, do not require degreasing, as the alkaline cleaner is adequate to remove the comparatively small amount of foreign matter on buffed castings and yield a chemically clean surface for plating.

In a sense, the operations described in this article may be regarded as a continuation of the machining dealt with in the prior article. Similarly, polishing and buffing are the preliminaries to plating to be detailed in the third and concluding article of this series. Once die castings are produced in this plant, they follow through a substantially continuous chain of processing operations until they issue ready for installation on the automobile or other product for which they are designed.

Openhearth Bottom Repairs

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London, England

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A mechanical device, developed in England, for extracting liquid metal from openhearth bottom cavities preparatory to patching is described in this article. This machine, designed as an accessory for mechanical charging units, employs vacuum to lift the metal to a refractory-lined container. The author also comments upon a machine used in Britain for applying dolomite or magnesite to bottom cavities.

OPEN hearth bottoms, both acid and basic, are subject to erosion during the melting and refining period. This erosion, due to various causes, leads to cavitation of the hearth and in furnaces of the stationary type, metal is retained in the cavities after tapping despite the slope of the hearth toward the taphole. If this metal is not removed before patching, and drying off resorted to, the patch will be temporary and will usually lead to further and more serious trouble.

Recent investigations into the production of reliable stabilized dolomite have placed an invaluable tool in the hands of basic furnace operators, and simplified the old problem of bottom repairs. However, this latter problem has not received the attention it deserves and as yet no effective means have been adopted to insure complete removal of the residual metal in the hearth before patching. The usual British practice in displacing this residual metal is by rabbling with long steel bars bearing flat wooden heads set at right angles to the length of each bar. This method undoubtedly dates from the inception of open hearth steel production and very little progress has been made for over 70 years. It rarely merits any attention in the literature dealing with the subject, and when mentioned is usually described as "a hot and arduous operation." This remarkable piece of technical understatement does not adequately convey the great labor and endurance required to cope with this openhearth problem.

Bottom cavities may appear in any part of the furnace bottom and vary considerably in size and position. Those occurring in the more accessible parts of the hearth may be easily cleaned out, provided they are not too deep. When the cavities are situated in the more difficult places, such as the breasts or between the charging doors, operations may last for several hours and efficient repairs may be impossible.

It is customary for personnel from all other furnaces to assist in cleaning and repairing a damaged bottom, and it is obvious that any lengthy repairs will dislocate normal melting shop routine and interfere with production. It is essential that the residual metal be removed quickly, an operation dependent upon several inter-related factors. Assuming that it is possible to manipulate rabbles into any given cavity, and this is not always so, efficient removal depends upon the fluidity of the metal, which is in turn dependent upon temperature and carbon content. The gas and air supply must be maintained to promote fluidity, although when this is done progressive decarburization of the entrained metal is inevitable, with consequent increase in viscosity. Additions of pig may help, though this is a temporary expedient only.

It is obvious to anyone engaged in steelmaking that if the metal could be rapidly removed, subsequent patching operations would be comparatively simple. If the cavities are large, mechanical means are available to deposit quantities of patching material wherever they are required. A logical development would be the introduction of mechanical means for liquid metal extraction to facilitate patching. It is reasonable to design such a device to be used as an accessory to the mechanical charging machine, since these machines are necessarily robust and equipped for rapid movement inside the furnace.

The problem may be approached from two directions, either that of mechanically ladling or scooping out the metal from the cavities and transferring to the taphole, or withdrawing the metal completely from the furnace by some system of vacuum extraction.

The first method has been adopted by H. V. Tomlinson (British Patent 560,129) and consists of a series of mild steel scoops of various sizes, designed to be attached to the ram of the charging machine, and to be manipulated by the driver of the machine. The use of the scoops may be facilitated by other devices included in the patent, such as scrapers to provide depth, or the scrapers may be used alone where the cavities are shallow and widespread. This method has proved extremely useful and the problem has been approached in a most realistic fashion. However, certain limitations have become apparent in practice.

The scoops and scrapers must be of rugged welded construction to withstand the temperature, as all the conditions such as temperature, fluidity, etc., required for efficient manual working still apply when mechanical means are used. The size and depth of the cavities are obviously not preordained and deep holes of comparatively small cross section cannot be attacked by this means. When large, deep holes are encountered, the scoops fail to extract the metal completely, as a certain quantity is displaced by the volume of the scoop used and is retained in the hole when the scoop is withdrawn. Further, the larger holes are usually amenable to manual operation and may even be attacked by two separate working parties operating simultaneously from two doors. Cavities occurring in the breasts are not easily emptied by this method, as the apparatus is not easily manipulated into position.

There is a need for an extraction apparatus which, while being wholly mechanical, is yet sufficiently flexible to be used in any cavity occurring in any part of the hearth. Such an apparatus has been designed by the writer, to be used in conjunction with the usual type of charging machine, and to rest in a charging pan held on the ram of the machine. A pan is selected which is open - ended, and rests on the sill of any of the charging doors in the vicinity of the cavity. The whole apparatus is thus under the control of the driver.

The complete device, illustrated in fig. 1, consists of a pump and a refractory lined air-tight receiver (shown in fig. 2) of rectangular shape of welded, mild steel construction. To one end of the box is fitted a detachable seamless

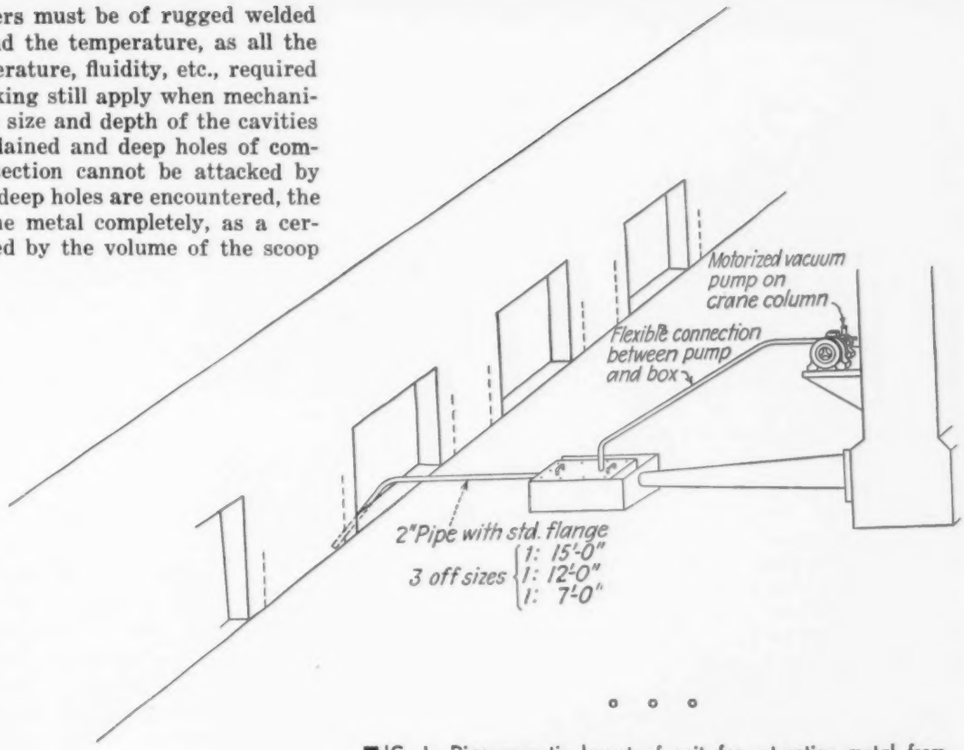

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FIG. 1—Diagrammatic layout of unit for extracting metal from cavities in the openhearth bottom. A slight positive pressure should be maintained in the furnace when using the apparatus.

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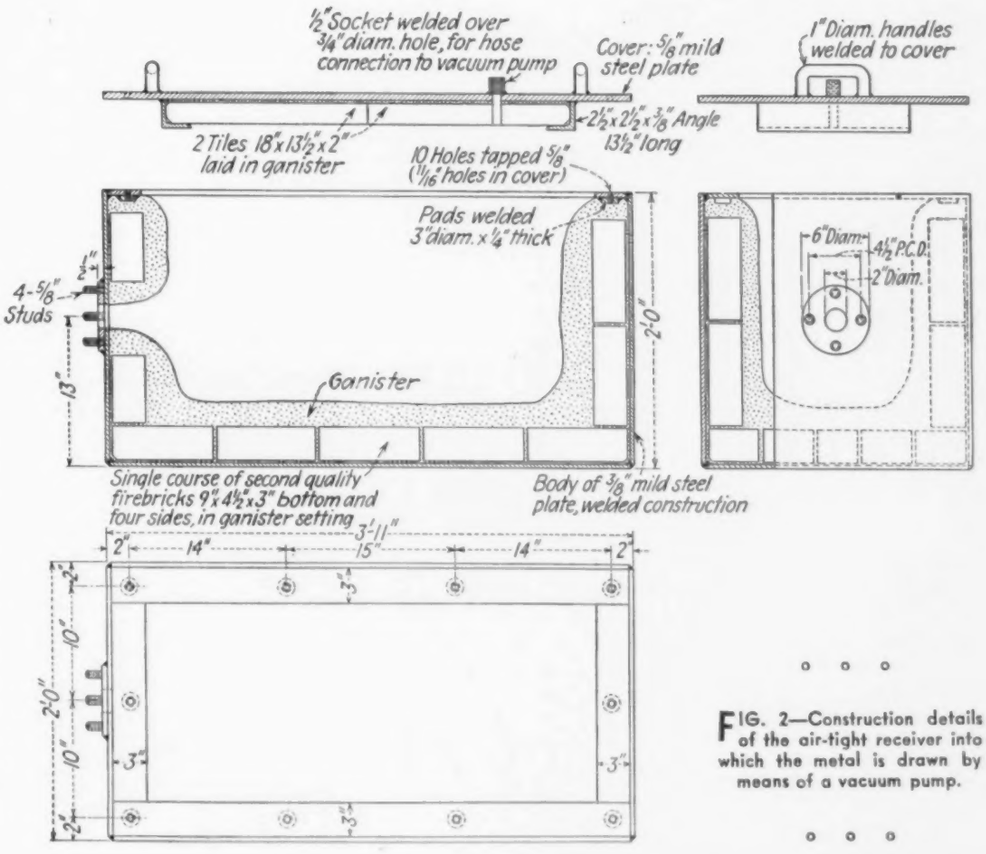

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FIG. 2—Construction details of the air-tight receiver into which the metal is drawn by means of a vacuum pump.

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steel tube, coated internally and externally with plastic refractory and closed at the free end with a wooden plug. A flexible connection leads from the lid to an electrically operated vacuum pump mounted on the charging crane column. Such a pump, capable of exhausting several cubic feet of air per minute and of holding a vacuum of approximately 26 in. of mercury, is readily available from most pump manufacturers.

In principle, the position of the cavity is estimated and a suitable length of pipe is selected which will be long enough to reach into the cavity, while the receiver remains near one of the furnace doors. The vacuum pump is started and the air in the receiver is exhausted. When this is done, the driver maneuvers the pipe into the selected cavity and the plugged end is immersed in the liquid metal. The wooden plug is burnt out and the metal is immediately raised by suction into the refractory lined receiver. The machine is then withdrawn and the apparatus deposited on the charging rack. The pipe is uncoupled and discarded, the lid unbolted and removed and the mass of solidifying metal is tipped out of the receiver by rotating the ram of the charging machine.

When the receiver is cool the ganister lining is removed and a new pipe may be fitted and the apparatus is ready for use once more. It is economical to have several receivers at hand, in the event of a number of holes being encountered they may all be handled without delay. The pipe could with advantage be made wholly of a refractory material, if it were possible to prepare such a structure in an air-tight condition. However, as the operation is rapid and the steel pipe lagged inside and out, there is no real danger of collapse during use. The complete apparatus is inexpensive in first cost and in maintenance. It has been designed to utilize standard equipment, pipes and flanges and bricks.

In Great Britain the majority of openhearth steel furnaces are repaired manually after each heat. Mechanical patching methods, using machines of the Blaw-Knox type, are in use on large furnaces, but are not used on smaller installations. When these machines are used to repair the hearths of furnaces of less than 100 tons capacity, the high delivery rate obtained is disadvantageous. It is difficult to maintain the slope and shape of the furnace hearth, and the consumption of repair material is greater than that obtained with manual repairs. This matter has received considerable attention and a recent British patent deals with the problem of mechanical repairs to openhearth furnaces.

Russell and Coy, and United Steel Companies Ltd., (British Patent No. 571,142) describe a device of cast or fabricated construction which has been successfully used in this connection. The device involves the use of the charging machine and consists of a horizontal arm having one end attached to the machine while the other end carries a container holding the repair material. The container is roughly pyramidal in shape, closed except for a slot formed in one end, and having the base of the pyramid inclined so that the edge bearing the slot is in the vertical position. Repair material, such as dolomite or magnesite, is enclosed in the container and trickles gently through the slot as the machine is manipulated by the driver. Distribution of the material is controlled by rotating the charging arm. The container is filled by rotating the arm and hence the container, until the edge bearing the slot is uppermost. A detachable hopper is then fitted to the container and the fresh supply of repair material charged through the slot opening. Though the slot is normally transverse to the axis of the arm, the size and shape can be modified to permit repairs in the more inaccessible parts of the hearth.

Plastic Chimney Coating Resists Heat and Acid

CORROSION problems such as are encountered in chimney liners are said to be overcome by use of a specialized plastic, Heresite, developed by Heremetal Co., Minneapolis. This coating has been found very effective for coating the flue liners for, when properly applied and baked, it is smooth and highly resistant to chemicals, moisture, heat, acids, salts and solvents. Hard, tough and resilient, it is said to have high resistance to chipping or cracking (see accompanying illustration), a feature desirable for conversion jobs where new liners must be forced into old chimneys.

Processing requirements of this installation were unusual because of the size and shape of the flue liners and the acute sensitivity of the plastic material to time or temperature variations. Tests showed that a forced convection oven was essential, capable of providing uniform, high volume heat flow throughout the chamber and with quick-response automatic temperature control. To meet these requirements, the company installed a Despatch batch type oven which proved capable of meeting the high heat flow necessary to bake 450 liners per load.

Heremetal uses aluminum liners instead of steel because the former is only ⅛ as heavy and the plastic will not chip from it. Liners are pickled and then cleaned in a hot caustic bath and etched with a hot muriatic and hot nitric acid bath. After each bath the liners are rinsed with water. Etching the aluminum makes the plastic adhere.

After the final rinse the liners are given two primer coats and two finish coats of plastic. The first three coats are baked for 20 min each at 300°F, the last coat for 1½ hr at 400°F. Baking of the last finish coat polymerizes all four coats into one and changes the color from yellow to a deep brownish purple with a high gloss finish.

New Equipment . . .

Power Transmission

Developments in several lightweight motors, variable transmissions, control valves, clutches, and gear boxes are described in the following pages. Renewable switches and relays are also included in the review.

LIGHTWEIGHT continuous duty geared electric motors have been introduced by *Jack & Heintz, Inc.*, 17600 Broadway, Cleveland 1. Model JH 13100 motor, illustrated,

designed for 28-v dc systems, is rated for continuous duty at 3 hp with a speed of 3800 rpm at the splined output shaft. This compact self-cooled unit, developed to operate at 40,000 ft altitude, weighs 19½ lb and occupies a cylindrical space approximately 6 x 10½ in. Furnished with prelubricated precision ball bearings, these units, available in sizes ranging upward from 1 hp, are claimed to operate efficiently in any mounted position.

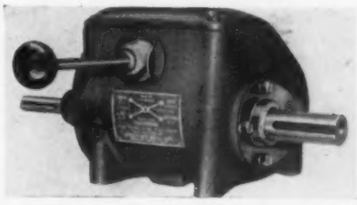
Lightweight Motor

AN extra-compact, light 2 hp explosion-proof motor has been developed for continuous duty by

Electrical Engineering & Mfg. Corp., 4606 W. Jefferson Blvd., Los Angeles. An aircraft type, with armature speed of 9000 rpm, this motor is said to be versatile in that it can be supplied for any output-shaft speed. An integrally built gear reducer, supplied where lower speeds are required, adds only 2 lb to the basic weight of 15 lb. This ball-bearing motor is insulated, making possible continuous duty operation with a temperature rise of 167°F over an ambient temperature of 77°F.

Variable Transmission

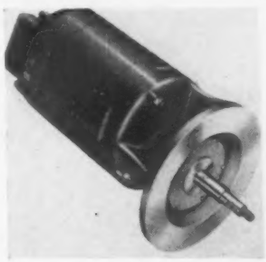
ADAPTED to flat plate or platform mounting, a transmission of new design, has been announced by *Western Mfg. Co.*, 3400 Scotten Ave., Detroit 10. This unit



identified as 9000 B series has 5 hp capacity with input speed of 900 rpm and has four gear changes, available through a one shift lever of automotive type. Ratios are 1:1, 2:1, 3:1, and 4:1, with special ratios provided when necessary. Gears and shafts are of alloy steel, heat treated, and gears are lapped. Revolving shafts are mounted on anti-friction bearings; the case is oil sealed.

Gear Motor

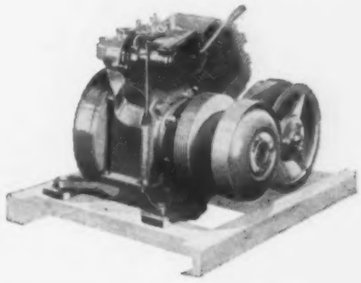
DEVELOPED for a homogenizer application where space is limited and where 5 hp has to be delivered at 8000 rpm, using 3-phase, 60-cycle, 220 v power, a gear motor has been announced by the *Electrical Engineering & Mfg. Corp.*, 4606 W. Jefferson Blvd., Los Angeles. This fan-cooled, open-type, two-pole 3600-rpm motor, has



an output speed stepped up to 8000 rpm by single reduction helical gears in a sealed gear box. The motor, it is claimed, is smaller, lighter, and more compact than the conventional ungeared motor.

Automatic Transmission

THE principle of adjustable diameter drive and driven pulleys linked by a V belt to provide varying drive ratios has been incorporated in an automatic transmission produced by the *Salsbury Motors, Inc.*, 4464 District Blvd., Los Angeles 11. The driving unit con-

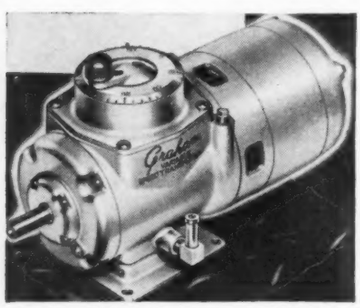


sists of a variable diameter drive pulley, a variable diameter driven pulley, and a V belt. These units

form a coordinated assembly which gives automatic, variable ratios over a 4 to 1 range. It is a torque converter. Drive ratio is controlled as a function of driven shaft speed. Normal overall reductions may range from 4:1 to 1:1 for light duty, high-speed units, and from 200:1 to 50:1 for heavy-duty, low-speed requirements. Automatic change of ratio within these limits may be adjusted to suit the needs of the individual user. The transmission may be originally assembled to limit the engine speed automatically to any desired value under normal operating conditions. Built into the drive pulley is the clutch, an automatic centrifugally-operated, opposed shoe type. The engine is a single-cylinder, four-cycle, air-cooled type, developing 6.5 hp at 3200 rpm. This 6 hp power package is claimed to possess advantages where high starting torques or momentary underloading or overloading occur.

Variable Speed Drive

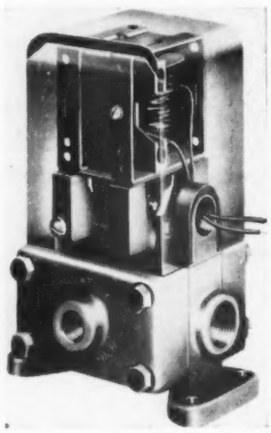
THE Graham variable speed drive, available in new models



and in two new sizes, has been announced by *Graham Transmissions, Inc.*, 3754 N. Holton St., Milwaukee 12. These models are said to be more compact, lighter in weight, and to out-perform those of previous design. While there has been no major change in the method of construction or operation of the new models, the design of many of the components and the use of die-castings instead of cast iron have made it possible to produce a unit at a price comparable to low-cost equipment. Model 15 is for motors up to ⅛ hp and model 40 for motors from ¼ hp to ¾ hp. These units may be had with or without built-in motor, with built-in parallel spur or right angle worm gearing, and in a variety of controls.

Three-Way Valve

SOLENOID - CONTROLLED 3-way valves for compressed air have been developed by *Numatics*, Milford, Mich. Incorporating the



fluid lever principle, they provide straight line air flow control with few working parts and little mechanical action. The solenoid draws less than 3 amp on 110 v 60 cycle current. The plunger travels a maximum of only 7/64 in. The exhaust port is one pipe-size larger than the supply and outlet, thereby providing rapid dissipation of the exhaust air. The user can select the setup desired by simply reversing the supply and outlet manifolds on the center body, making it open to exhaust and closed to pressure, or vice versa, with the solenoid energized or de-energized. Valves can be mounted in any position and are available in 6 sizes from ¼ to 1¼ in., to handle operating pressures from 0 to 150 lb.

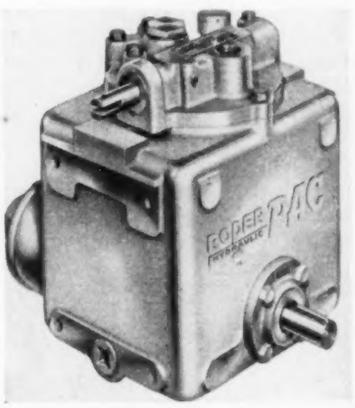
Control Actuator

AN automatic control actuator, known as the Beck Mechanism, which operates valves, rheostats, auto transformers and similar de-

vices, has been announced by the *Harold Beck Co.*, 3644 N. Second St., Philadelphia 40. The device is said to make close control possible under rapidly changing loads, hold temperature or other conditions to an exact control point free from the drooping characteristic, and to permit operation at maximum sensitivity. This triple function system is based on three control actions. The first is proportional to and opposes any change of the controlled condition within the throttling range, the second is the major part of the automatic reset or droop correction, and the third action consists of an impulse that is periodically introduced to move the regulating device in the proper direction to restore the system to the control point. Problems involving sequence action interlocks, directional contacts, maintaining contacts, and switching arrangements are some of the uses for this control actuator. Each mechanism is driven by a slow speed, high torque, noncoasting control motor. The heavy motor shaft turns in grease-sealed ball bearings. The armature, it is claimed, can be stalled without damage to the mechanism and the stalled motor will not overheat.

Hydraulic Power Unit

KNOWN as the Roper-Pac, a self-contained hydraulic power unit designed for universal applica-



tion on farm tractors, has been manufactured by the *Geo. D. Roper Corp.*, Rockford, Ill. This portable compact power package contains three fundamental elements: A precision-built rotary gear pump, control valves, and a rugged oil reservoir. Control valves are designed with an unloading feature which is said to prevent damaging heat buildup and overloading. The unit is built with either clockwise or counter clockwise rotation, with a range of operating speeds from 500 to 1000 rpm. The normal operating

pressures are 800 psi and for flash loads, up to 1200 lb. The capacity is 5 gpm at 500 rpm at 600 psi. The Roper-Pac weighs 42 lb.

Control Valves

VALVES for air and hydraulic controls have been designed by *Hanna Engineering Works*, 1765 Elston Ave., Chicago 22. One type is a packless ¼-in. capacity valve called Hanna Unitite Jr., for tubing and light piping applications. Precision-built and permanently tight,

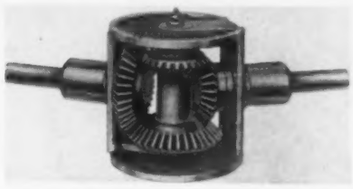
it is designed for 4-way operation, but may be used as a 3-way valve by plugging one port. This model is said to be suitable for air, oil, or water in pressures up to 250 psi and available for manifold, column, or panel mounting. A foot-operated valve is a packless, effortless control for use in air and oil hydraulic cylinder applications. It is made in two styles, one with single pedal for constant cycles of operation, and the second with split pedal that holds position until tripped for reversal. This model is available in ⅜ in., ½ in., ¾ in. and 1 in. and operates on 250 psi air pressure or 1000 psi oil pressure. Control of cylinder piston speed in both directions is accomplished by the Hanna two-direction speed control valve. It provides for adjustable control of inflow and outflow of air or oil independently to and from one side of the piston. One valve is used for oil operation, two are recommended for air. Working pressures are 250 psi for air cylinders and 1000 psi for hydraulic. Pipe sizes available are ¼ in., ⅜ in., ½ in., ¾ in. and 1 in.

V Belt Matching Machine

DESIGNED to measure and compare V belts, the Flexoid V belt matching machine has been produced by the *Smith Power Transmission Co.*, 1545 E. 23rd St., Cleveland 14. This machine measures length of V belts under tension equivalent to operating conditions. A vertical model, 10 ft 4 in. high, with a machine base 24 x 33 in., matches A, B, and C section industrial V belts from 38 to 180 in. in length. A standard horizontal machine, 15 ft long, 40 in. high, matches A, B, C, and D belts from 38 to 300 in. in length. These machines may also be used to determine the exact pitch length of a V belt. Sections for measuring longer belts up to 540 in. are also available.

Flexible Gear Turrets

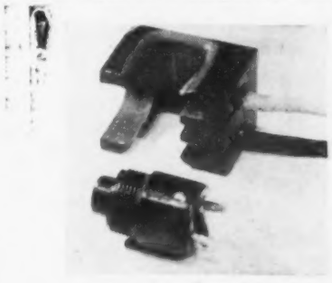
FLEXIBLE gear turrets, designed for connecting shafts which form any angle between 0° (straight line) and 95° on either side of zero angle, have been introduced by the *Brooks Equipment*



Corp., 217 Hudson St., Hoboken, N. J. An arrangement of the bevel gears attached to shafts which are supported in hinged housings permits the shafts to oscillate and rotate simultaneously. Horsepower capacities are based on the Lewis formula and are consistent with standard power transmission practice used for shafts ranging in size from ¾ to 1½-in. diam. Two types of brackets for supporting the gear boxes are offered.

Renewable Switch

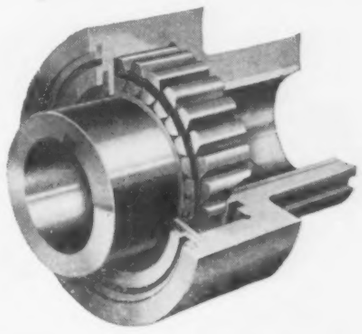
A SMALL, single pole, single throw renewable switch has been announced by *Robert Hetherington & Son, Inc.*, Sharon Hill, Pa. This switch as a standard article can be used in a single hole mount-



ing and has two flat studs protruding out the back to which lugs may be attached. When the switch is used as a renewable type, the studs slide down between two contact bars in the back of a cradle; the front part of the switch slides down through a slot in the front of the cradle. This cradle can be attached to any flat surface by countersunk screws. The whole device is a little over an inch long and ¾ in. high.

Over-Running Clutch

AN over-running clutch consisting of cylindrical inner and outer races, with the annular space

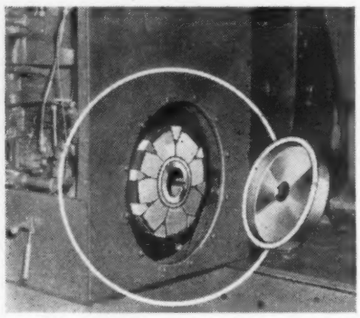


between them filled with accurately formed sprags has been announced by the *Gear Grinding Machine Co.*, 3901 Christopher, Detroit 11. Contact with both surfaces is maintained by an energizing annular spring at each end of the sprags. When torque is applied all sprags are rotated at the same time, gripping both inner and outer races to form what is practically a single piece of metal. Once torque is removed, all sprags release instantaneously. Positive engagement may be made hundreds of times per min. Due to the large number of sprags, localized stress is reduced to a minimum, and wear is evenly distributed throughout all surfaces. The simple design permits the greatest possible torque capacity for size and weight.

Automatic Clutch

KNOWN as the BLM Auto-Centri clutch, an automatic clutch has been added to the line of *Hardinge Co., Inc.*, York, Pa. When installed with an electric motor drive, a standard squirrel cage motor with across-the-line starting equipment can be used, it is said, in place of a slip-ring or high-starting torque squirrel cage motor. As the motor approaches full-load speed and maximum torque, the clutch picks up the load gradually, eliminating shock loads. On drives using internal combustion motors,

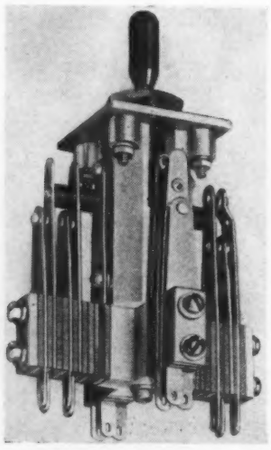
the clutch will automatically disengage the load when the motor is throttled to idling speed. Three main elements, a driving hub, the driven hub, and driving mechanism, make up the automatic clutch. Sec-



tional liners on the drive body can be replaced through a slot in the driven hub without removing any parts of the clutch. Sizes from fractional horsepower to 5000 hp for any type of power drive are available.

Five-Position Switch

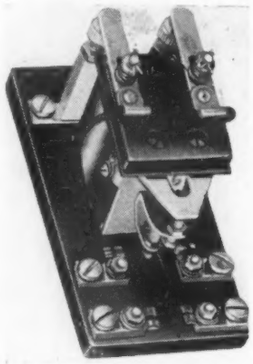
TWO features which are said to provide ease in assembly and wiring of a five-position cam-lever switch, announced by *General Control Co.*, 1200 Soldiers Field Rd., Boston 34, are single hole mounting of the switch frame to the panel and single bolt assembly of the contact block to the switch frame. The single bolt assembly permits soldering of the wiring to the contacts to be done where it is most convenient: away from other units, even at a bench if desired. The switch is locking or nonlocking in all posi-



tions except the center position, which is always locking. Motion of the switch from the center to all switching positions is straight line. The fine silver contacts are permanently riveted to nickel-plated phosphor-bronze contact springs and all parts are noncorrosive. Contacts are rated at 10 amp, 125 v ac.

Heavy Duty Relays

DESIGNED for heavy duty industrial and electronic applications such as light contactor duty, control of single phase motors and other remote or automatic control purposes, Bulletin 130 relays have been announced by *Ward Leonard Electric Co.*, Mt. Vernon, N. Y. Contact arrangements are available from one to four poles, normally open or normally closed, single or double throw. Operating voltages for dc relays are from 6 to 230 v and for ac from 6 to 440 v. Standard features are molded phenolic bases, accessible front connected



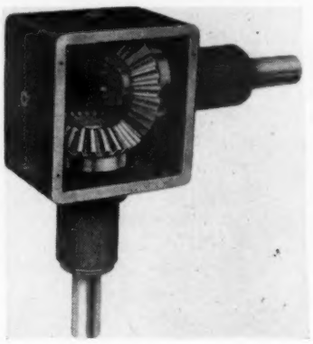
terminals and corrosion resistant finishes on all metal parts. They are manufactured with mechanical interlocks for reversing service and with mechanical latches for manual or electrical control.

Repeat-Cycle Timer

AN electronic timer, the Photoswitch repeat-cycle timer, type 2T15U, has been announced by *Photoswitch, Inc.*, 77 Broadway, Cambridge 42, Mass. The unit is designed with either momentary or sustained contacts for timing interval control. Each timing period is adjustable from 1/20 sec to 2 min. Control is accomplished through snap-action relays. Interval variations in repeat cycle timing are said to be less than 2 pct. Output connections are a single pole, double-throw switch for normally open and normally closed operations. The timer may be set by dials located either on the timer itself or in a small housing at a more convenient location.

Miter Gear Boxes

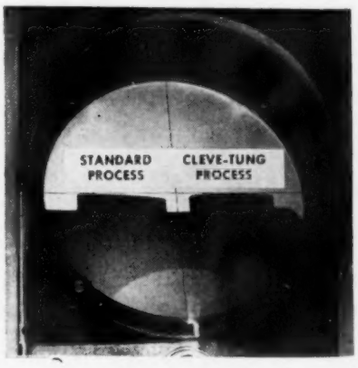
ADDED to the line of flexible equipment manufactured by *Brooks Equipment Corp.*, 215 Hud-



son St., Hoboken, N. J. has been a series of miter gear boxes and brackets. Great strength and resistance to shock are said to characterize the fabricated steel construction. Extra long hubs provide for self-lubricating Oilite bearings and oil reservoir, plus a place for support of the gear box by the clamp brackets which are designed to allow lineup in one place during installation. Oil sealed and plain types are offered in shaft sizes ranging from ½ to 1½-in. diam. Gear dimensions and horsepower ratings are in accordance with standard power transmission practice.

Radius Grinder

DEVELOPMENT of a method of radius grinding for electrical contacts by which the radius is controlled and centered has been announced by *Cleveland Tungsten, Inc.*, 10200 Meech Ave., Cleveland



5. It is said this process, known as Cleve-Tung, virtually eliminates floating radii. This company has also perfected manufacturing processes whereby, it is said, closer tolerances in disks are made possible, and parallel-faced contacts may be produced.

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Assembly Line . . .

WALTER G. PATTON

• Fifty - year anniversary to be gala event . . . Shortage of parts causes plant closings . . . Research tries to cut costs.

DETROIT—This city has its fingers crossed, hoping it won't get caught with its plants down when the 2-week Automotive Industry Jubilee commemorating the 50th anniversary of the birth of the automobile is held here commencing May 29.

With all motor car producers and many civic organizations cooperating, the Automobile Manufacturers Assn. has arranged a program of events that will surpass any similar event in the city's history. Highlights of the program include the industry's reception and dinner honoring its pioneers, re-enactment of driving the first Ford car and the first King car of 50 yr ago, and the "Motor City Cavalcade," a parade which will feature early forms of transportation, including old cars and trucks, and floats by Detroit firms and civic organizations. All participants will be in costume.

Showmanship has not been overlooked. Big name stars of the stage, screen and radio and name bands will be featured in the jubilee activities to be held June 1. In addition, the Jubilee Committee will hold an exposition in which the public will be able to contrast the new cars with scores of early makes of automobiles and trucks.

Whether the jubilee celebration will be playing against a backdrop of closed automobile plants will largely depend on progress made in settling the coal and railroad strikes. If the coal impasse continues and a rail tie-up or an embargo on freight movement is in effect, industrial activity here will undoubtedly hit bottom with a dull thud. Ford is already closed down and will remain closed for at least 30 days.

Closing of the huge Rouge plant has been made necessary by so many parts shortages that it is difficult to foresee reopening of the plant for assembly purposes until a satisfactory bank of parts is built up. If this policy is followed, the Ford reopening will lag behind the coal settlement by several weeks.

The announcement of a General Motors shutdown—later countermanded—was predicated on the disastrous effects that were expected to follow an embargo on freight movements. Reinstatement of these freight restrictions will undoubtedly bring the unused GM order out of the files promptly.

The situation is much the same with Chrysler Corp. which has been eating away steadily at the stock of parts the company was able to build up while getting into production. Since Jan. 1, 1946, Chrysler has built an estimated 206,500 cars and trucks in all its divisions and there have already been public statements calling attention to curtailed production schedules and the critical situation with respect to parts supply.

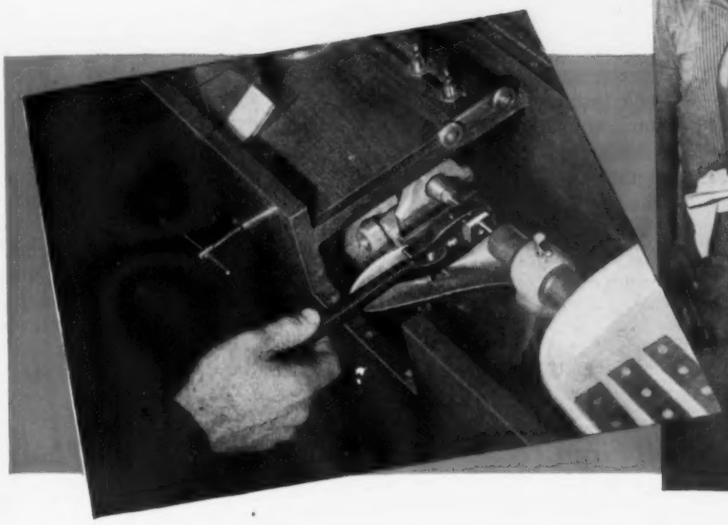
Hudson, Nash, Studebaker and others have been similarly affected by the bottlenecks in automobile supply lines. Several truck builders who are wholly dependent on outside suppliers for all parts going into their vehicles are completely at the mercy of the touch-and-go conditions existing in the automotive parts industry.

As this is written, steel sheet is the most talked-about in the long list of automotive items currently in short supply. Few buyers in the automotive industry look for a quick change in this situation and those who have given the subject careful study are not inclined to look for much improvement before 1947. Their pessimism is understandable when some of the conditions contributing to the present shortage are examined.

WAITING FOR LEWIS: *Except for the coal strike, these long-awaited* 1947 *model Studebakers would be coming off the assembly lines in South Bend, Ind. June production was scheduled at* 25,000 *units but assemblies to date have been limited and shipments to dealers have not yet begun because of the coal tieup and parts shortages.*

Double Check √√

FOR BASIC ACCURACY



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- Blocks are washed and cleaned.
- Blocks are inspected visually by a magnifying glass to detect burs and bruises.
- Large bruises and nicks are removed with a hand stone.
- Both sides of each block are hand rubbed on a large stone to remove smaller burs.
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TO go back a few years, it will be recalled that many sheet mills were converted to plate production to meet war needs. As a result, skilled workers were displaced and many of these men have not come back to their jobs. At the same time, handmills which in normal times turn out a substantial amount of sheets were decommissioned, either permanently or for the duration. The sheet capacity lost permanently as a result of dismantled handmills has been estimated at 1,801,600 tons annually; the total handmill capacity listed in 1938 was 4,190,800 tons.

While plans were made to replace some of the scrapped handmills, deliveries of new equipment have been set back several months by strikes at Westinghouse and General Electric Co. New mills originally scheduled to go into operation this summer have been delayed in some instances as much as a year.

Obviously, the unprecedented demands for sheet and strip steel by all industries that are asserting themselves today play a major role in the present shortage. At the same time, it should not be overlooked that many manufacturers are now taking advantage of all the new fabrication techniques developed during the war. Stampings fabricated by welding or brazing are replacing castings or forgings at every opportunity. This also raises the demand for sheets, pushing the total still higher than it would have been in any previous period of production when the same number of products was being made.

When these factors are properly weighed and the total effect on demand and supply are considered, the present dilemma of the automotive and other industries with respect to sheet steel becomes understandable. Unfortunately, however, a searching review of the situation does nothing at all toward providing a solution to the problem. The fact that the popular-priced car requires about 1000 lb of sheet steel (including service parts) is an excellent reason why the automotive industry is pessimistic about an immediate change for the better with respect to available supplies of sheet and strip steel.

A TREND that is observable here is the change in the emphasis on research and development from new materials and new products to production research. That is to say, limited car production to date, the high hourly cost of labor and its decreased productivity have emphasized the need for reducing unit production costs. The development of new machines, devices or production methods that will reduce production costs is now a major activity of most automobile laboratory staffs.

One result of this new emphasis might be a greater change in production methods than the industry has seen in some time. Meanwhile, if motor car design and the materials used do not change as much as the public expects, the reason might be that these items have been de-emphasized temporarily in favor of the less spectacular job of producing motor cars in large numbers at a profit.

Ward's Reports, Inc. has estimated automobile and truck production for the week ended May 17 at 49,905 cars and trucks; previous week; 71,335; year ago 21,260. The Ford shutdown and curtailed operations at other plants is responsible for the sharp decline in output.

Detroit is determined to carry on in the face of strikes and rail restrictions or stoppages. Lt. Gen. William S. Knudsen general chairman of the National Automotive Golden Jubilee has announced, "We are going right ahead; we are not sitting down. The Automotive Golden Jubilee will open—and on time. The main idea behind the jubilee is to dramatize the necessity for united community action to meet today's community problems. We are reaching out for that goal toward which all noses should be pointed today—greater happiness and more material rewards for greater numbers than ever before."

Urges Small Firms To Unite Against Unfair Demands From Unions

Detroit

• • • **Small business** may well be doomed under today's pattern of legislation and government administration of the labor laws, combined with the search of unions for more membership, more dues and more power, according to "Tool Trends," publication of the Automotive Tool & Die Manufacturers Assn., Detroit.

According to the association, no small business can by itself fight the same kind of all-out battle that a large company can and as General Motors did. In any last-ditch fight, the small business must face the fact that even if it can afford to shut down and outwait the union it will, in the meantime, lose most of its trade and ultimately its life.

The bad plight of small business has been highlighted in Detroit recently by the efforts of a big union, the AFL Teamsters, to organize neighborhood grocers and butchers. Newspaper indignation has run high at what the publication calls "this quite obvious strongarm of small stores, most of them owner-operated."

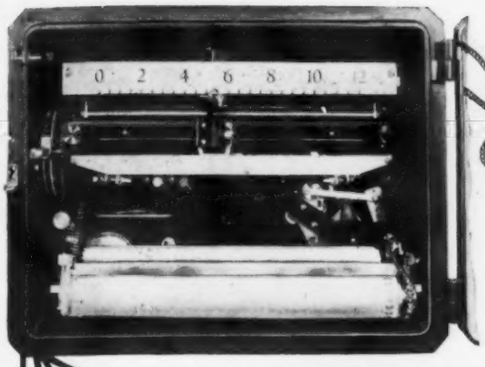
The publication continues: "If the victim is big, able to cope with the union under about as near equal terms as is possible under the Wagner Act then the conclusion is a compromise. If the victim is small, utterly unable to withstand the pressure imposed by the labor organization, then the surrender is unconditional."

The following course of action has been recommended to members of trade associations:

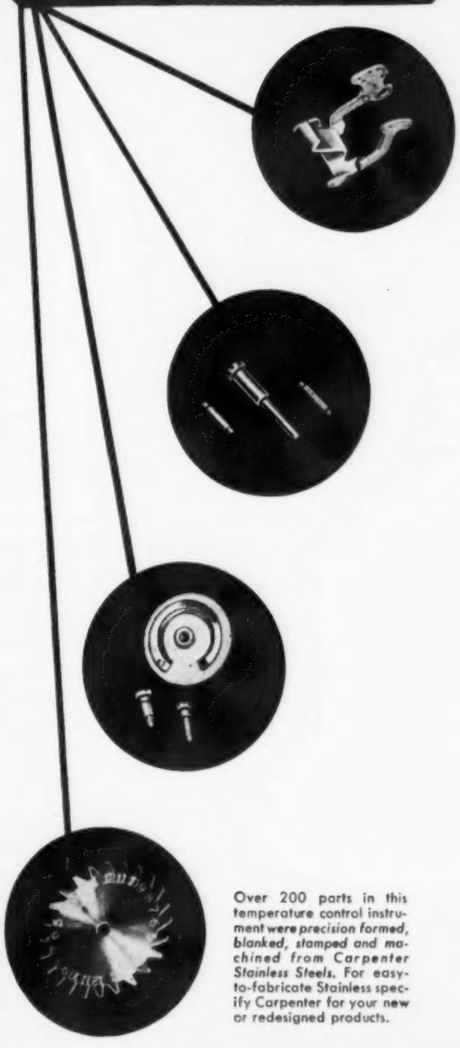
Small business from one end of the country to the other, in all fields, should unite in adoption of the unions' own tactics which have served them so well—defiance of law by edict.

The unions, says the association, have made no bones about taking the courses which suit their objectives whenever those courses seem advisable—illegal picketing, disregard of collective bargaining agreements, wildcat strikes, sitting down against government agency decisions which displease them, and ultimate circumvention of most of those decisions.

Small business, it concludes, should do the same on a national scale. It has become impossible to amend the unfair Wagner Act, which led to most of today's troubles, by normal means. But refusal to obey labor agency edicts as such, until they are proved in court, could dramatize the situation and kindle a nationwide demand for change in the law.



How to IMPROVE YOUR PRODUCTS and LOWER UNIT COSTS



Over 200 parts in this temperature control instrument were precision formed, blanked, stamped and machined from Carpenter Stainless Steels. For easy-to-fabricate Stainless specify Carpenter for your new or redesigned products.

REJECTS CUT 50% ON PRECISION INSTRUMENT PARTS WITH CARPENTER STAINLESS

When a manufacturer can improve his product and lower unit costs at one and the same time, his methods bear investigating. Here's the story of a control instrument manufacturer who did just that by switching to uniform, easy-working Carpenter Stainless Steels.

In the first place, parts for temperature control instruments like this must be precision-made to give accurate readings. Second, they must be long wearing to provide years of trouble-free service. Third, they must be corrosion resistant to keep functioning in the face of corrosive industrial fumes and dust.

All signs pointed to Stainless Steel. But *ordinary* Stainless wouldn't do. It had to be Stainless that would machine, blank, and form easily and economically, lot after lot.

You can imagine how pleased the manufacturer was when he found that easy-working Carpenter Stainless Steels not only filled the bill on every count, but *cut rejects in half!*

It just reaffirms a point we've been constantly stressing; you can do it better at lower cost with Carpenter Stainless Steels. Keep this in mind when you plan your new or redesigned products. And remember your nearby Carpenter representative can give you experienced help in selecting the *right* Stainless for the job.

FOR SHORT CUTS to making finer products at less cost, send for your copy of "Working Data for Carpenter Stainless Steels". A note on your company letterhead, indicating your title is all that's necessary.

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Washington . . . .

L. W. MOFFETT

• Slow procedure and lack of understanding giving rise to growing dissatisfaction in vast disposal of surplus plants and equipment.

WASHINGTON — Rumblings of discontent concerning the surplus property program are beginning to rise above the general postwar clamor. Capitol Hill, fearful of possible "scandals," mutters ominously of investigations; low or nonpreference groups are registering vociferous protests that they are unable to get goods or that they are treated unfairly.

All of this serves to focus attention on a number of major aspects of the surplus problem—the vastness of undertaking, the impossibility of administering such a program with any measurable degree of satisfaction, and the huge losses incurred by war, not only in a direct monetary loss to the taxpayer but in the waste of material and natural resources of the nation.

Some of the dissatisfaction stems from misconceptions which have never been completely dispelled. One of these is the amount of surplus which some still believe should return enough to take a sizable bite out of the national debt. Another is that it is a simple merchandising job to be handled like that of any private undertaking except on a much larger scale. Still another fallacy is that all surplus is recoverable and in new or good condition, ready for immediate use.

Best available figures indicate that out of a total of $270 billion of war production—not including about $45 billion shipped to allied nations—about $30 to $35 billion in domestic holdings will eventually be declared surplus. It should be kept in mind that this represents the original investment and not the selling price. So far in the disposal program, a return of about 45¢ on the dollar has been realized and this may be expected to decrease somewhat as new production is made available on the markets.

About half of the anticipated $30 billion total is tied up in war plants and real estate; of the remaining half, some $4½ billion represents unsalable aircraft and another $3 billion involves special purpose items and commodities which have no nonmilitary use or value. Obviously, this $7½ billion must be disposed of as scrap material.

This leaves roughly about $7 billion in civilian-use goods to be sold —consisting of tens of thousands of kinds, in all sorts of condition, in scattered locations which often are at a distance from markets, and each type demanding a different type of merchandising. Less than a fourth of the $7 billion worth constitutes the most desirable class of surplus — consumer goods which might normally be found on department store shelves or in the pages of a mail order catalog.

This huge task of disposal has been placed in the hands of a specially created agency that has no control over quantity, quality or source of supply—a situation that would be intolerable in private business, large or small. The WAA can recommend and urge holding agencies to release the goods but it cannot compel them to do so; whatever the agencies do release is what the WAA must sell for what it can get.

This is amply illustrated in the fact that of about 1500 war plants considered suitable for conversion to peacetime production, little more than a third of the total has been declared surplus. From an overall viewpoint, the situation is a little better. About half of the $30 billion or so in domestic surplus has been declared.

In addition, the agency is bound by all the laws and practices established for operation of regular government departments and bureaus, the purpose of which are at wide variance with that of WAA and not well adapted to the job in hand.

As far as that goes, the Surplus Property Act itself works to hamper smooth functioning of the disposal agency. The Act lays down no less than a full score of objectives and lines of procedure to be followed. It would be useless to try to interpret and follow these literally because of their contradictory nature. For example, one provision orders rapid disposal and at the same time another demands a reasonable return on the government investment. One or the other must suffer.

The Act also provides that plants shall be disposed of by either lease or sale. While outright purchases are often made, many other transactions involve leases for periods of from a few months to as many as 15 yr. Obviously surplus plant disposal will be a continuous operation for the period of the longest lease. In addition, plant disposals involving a million or more dollars must be reviewed by the anti-trust boys and others before the sales become effective, adding to the delay.

The Act also establishes certain priorities and preferences which have brought loud and angry protests from veterans who were, roughly speaking, in the fourth preference group. They found that after higher preference groups, which included schools and certain nonprofit organizations, had exercised their priorities there was little or nothing left that was worth having, especially in those items which are in short supply.

This specific situation was quickly ironed out by Congress through the simple expedient of tacking another amendment onto the Act which placed veteran preference second only to that of the Federal Government itself. This resulted also in the setting aside of specific items in short supply for exclusive sale to veterans. This fell short of being entirely satisfactory, however. Even by limiting the quantity sales of critical goods to one to a veteran, there aren't enough

World's largest open hearth gets a RAMIX bottom

THIS All-Ramix hearth was installed in one of Weirton Steel Company's 400-ton open hearth furnaces last November. 124 heats had been tapped from it on April 1st, and as with all the other Ramix installations at Weirton, this bottom is in excellent condition.

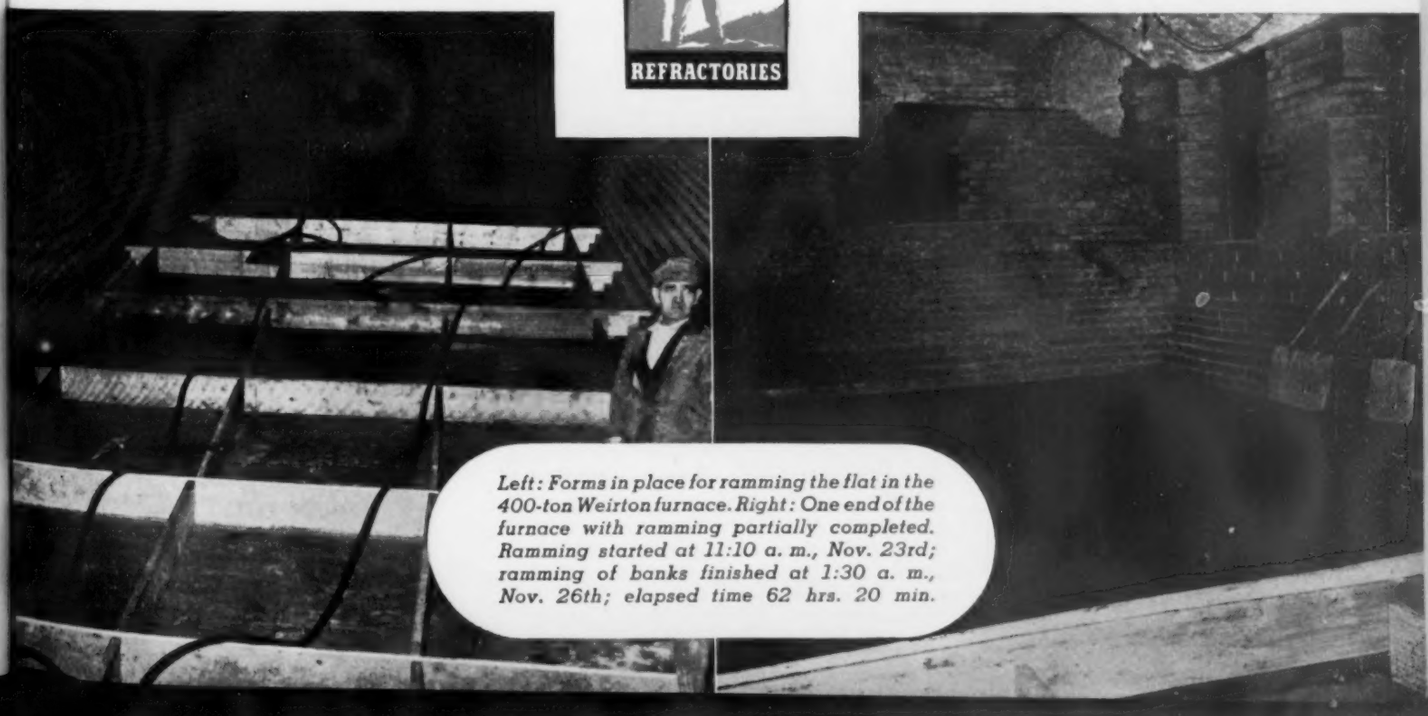
Where it would have required 12 to 14 days to burn in a conventional magnesite hearth, this Ramix job took only 144 hours, from the start of cold ramming to the charging of the hot furnace, with hearth fully matured and slagged. Two shifts of three rammers each operated air hammers, without interruption, for 62⅓ hours, to ram the 156½ tons of Ramix required. The refractory was mixed in a cement mixer and a complete set of forms was used.

This was the seventh Ramix hearth put in at Weirton—one of over 300 in the open hearth industry—many installed under the personal supervision of Basic Engineers. Success with cold rammed hearths at Weirton, as at 144 other open hearth and electric shops, is the result of three important factors: (1) use of the right material; (2) correct installation procedure, and (3) good maintenance practice.

The services of Basic Refractories Engineers are available to any steel company, for advice and help on refractory problems. BASIC REFRACTORIES, INCORPORATED, 845 Hanna Building, Cleveland 15, Ohio. *Exclusive Agents in Canada:* Refractories Engineering and Supplies, Limited, Hamilton and Montreal.

BASIC FURNACE

REFRACTORIES



Left: Forms in place for ramming the flat in the 400-ton Weirton furnace. Right: One end of the furnace with ramming partially completed. Ramming started at 11:10 a. m., Nov. 23rd; ramming of banks finished at 1:30 a. m., Nov. 26th; elapsed time 62 hrs. 20 min.

to go around in some lines—such as automotive vehicles and typewriters.

Now another headache is developing in this respect in the way of increasing complaints that veterans are "abusing" their rights by acting as fronts or as virtual brokers in obtaining goods for persons other than themselves. Action is being taken to prevent this on a large scale but officials see little hope of stopping it entirely. One impediment obviously would be the political reluctance of Congress to tighten the ban on veterans. While such activity is certainly contrary to the intent of the law, it would be hard to prove small-scale violations or prevent resale of single items for which the owner "no longer had any use."

Another factor concerning surplus disposal which readily lends itself to misunderstanding is the amount of time required to get goods on the market. In some lines, by shutting eyes to red tape and using a peeling-off process—i.e., "peeling off" certain items of greatest importance and concentrating on their sale—it has been possible to get some goods on the market in record time. This is usually done at the expense of creating delay in other lines.

Normally, about 100 days are required to get surplus consumer goods ready for marketing. Before disposal, such commodities must be inspected in order that accurate and complete trade descriptions may be provided; their sale must be programmed; either advertising must be arranged or announcements sent out; and finally, the sales must be made.

Adding no little to delay in preparing goods for sale is the fact that a large proportion of the surplus items has come from the military services which use peculiar stock-keeping methods. For instance, the Army considers a screwdriver a screwdriver regardless of its brand, size, design or purpose and it gives all types of this tool the same stock number. The disposal agency must sort, classify and prepare descriptions of such items before it can even advertise or announce them. It is difficult to obtain qualified personnel who are sufficiently familiar with certain special lines, such as machine tools, to properly identify and tag the items for sale.

It has been reliably estimated that to classify, price and dispose of this $7 billion worth of salable consumer surplus (excluding war plants) by mail order department store methods would require the services of nearly 235,000 persons and about 2000 sales offices or stores throughout the country. In comparison, the combined staff of WAA's Washington headquarters and its 33 regional offices amounts to around 25,000 people, a large proportion of which is necessarily office and administrative types, leaving a relatively small selling force.

Those most familiar with Washington and the government look on the job of surplus property administrator with distaste and one impossible of successful fulfillment. Rather, they regard it as an assignment which would rip the finest administrative record into shreds. There are few men who would care to accept its responsibilities and inevitable criticism. The present administrator, Gen. Edmund B. Gregory, as an Army officer and subject to assignment of his commander-in-chief, had little choice in the matter.

His was the logical choice for the post. A man of undisputed ability and personal integrity, as wartime Quartermaster General he directed the expenditure of upwards of $30 billion for food, clothing and general supplies for the fighting forces. This was accomplished with a minimum of criticism and no hint of scandal throughout this huge buying operation.

Now the position is reversed. He must dispose of a like amount of property in a manner pleasing to all. As previously stated, not even Solomon could do it.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

AH--MEMORIES! THEY PASS IN REVIEW--ALL TH' BOYS HE STARTED IN TH' MACHINIST TRADE ON THAT OLD SHAPER--PLEASANT DREAMS, OL' BOY!
NOT PLEASANT, I DON'T THINK--ONE BECAME A SALOON KEEPER, ONE A LAWYER, ONE A POLITICIAN, ONE'S IN TH' PEN, ONE'S A HOBO, AN' ONE'S A CARTOONUTS!
IT'S A HOODOO, THAT MACHINE--IT TURNS OUT EVERYTHING BUT MACHINISTS AND WORK!
5-24 J.R.WILLIAMS
T M REG U S PAT OFF
THE NON-PRODUCER
COPR. 1946 BY NEA SERVICE INC

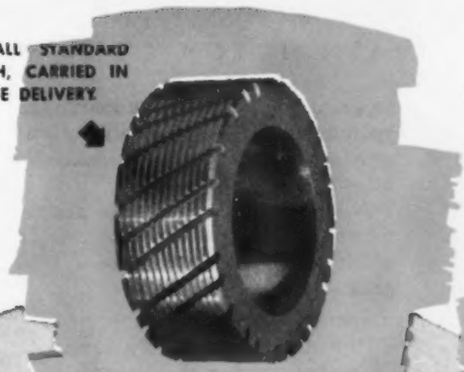
SKF Makes Journal Boxes

Philadelphia

• • • **A production** line to manufacture railway journal boxes has been installed at S.K.F. Industries, Inc., William L. Batt, president, has announced.

Production of the journal boxes already has begun, and the schedule calls for a minimum annual production rate of enough boxes to equip between 1250 and 1500 new streamlined passenger cars.

CRUSHER ROLLS FOR ALL STANDARD THREADS 8 TO 32 PITCH, CARRIED IN STOCK FOR IMMEDIATE DELIVERY.



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Grinding with crush dressed wheels has so many advantages from the standpoints of accuracy, speed, and economy that it took little time for it to become firmly established in the metal working industry. Sheffield, the American pioneer of this practice on a commercial basis, can furnish you with the equipment you need to put it into operation in your own plant.

SHEFFIELD PRECISION THREAD AND FORM GRINDER FOR DUPLICATING CRUSHER ROLLS AND THE MASS PRODUCTION OF WORK PARTS THREADED OR FORMED.

POWER CRUSHING DEVICE FOR USE ON THE SHEFFIELD THREAD AND FORM GRINDER FOR THE ACCURATE CRUSHING OF WHEELS.

SHEFFIELD MICRO-FORM GRINDER FOR PRODUCING THE ORIGINAL CRUSHER ROLL, FLAT OR CIRCULAR FORM TOOLS AND PROFILES OF ALL KINDS.

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West Coast . . .

ROBERT T. REINHARDT

• Wendell Berge's new book "Economic Freedom for the West" is perused for clues to his attitude toward bidders for Geneva steel plant.

SAN FRANCISCO—Western industrialists have been scanning the recently published book, "Economic Freedom for the West" by Wendell Berge, Assistant Attorney General, in the hope of finding there a clue to the stand this famed Antitrust Div. head will take in the matter of selling or leasing of the Geneva steel plant.

Based largely on the speeches Mr. Berge made on western trips, the book of 14 chapters presents a comprehensive analysis of the economics of the West and includes a section on steel which contains several references to the Geneva plant which may be indicative of how the author will use his influence with the War Assets Administration which is charged with disposal of the plant.

Quoting from the chapter on western steel:

"The abuses of the basing point system have affected the West in many industries, most notably in steel, petroleum products, sugar and cement. In this connection, the Report of Attorney General Biddle to Congress on western steel plants and the tinplate industry stated that the elimination of monopolistic control from the East, including the basing point system, constituted one of the most important conditions to be met in providing a basis for large-scale western operations."

After discussing briefly several of the reasons for the long delay in the establishment of a western steel industry, Mr. Berge gives the following statement by Henry J. Landahl, secretary-treasurer of the Pacific American Steel & Iron Corp., Bellingham, Wash., as presented on Aug. 6, 1942 before the Truman Committee:

" 'Historically the effort an iron and steel industry on the Pacific Coast has been undertaken on many occasions in the last 30 yr, efforts in which the officers and directors of our corporation have participated and in which they have invested substantial sums of money and a great deal of time and effort. There has never been a question of the feasibility of an iron and steel industry in this area, but on each occasion when the efforts have been made to establish an industry, the planning and work of those engaged in the project has been frustrated through connivance and intervention on the part of existing steel corporations and existing financial combinations.' "

The Pacific American Steel & Iron Corp. was one of the bidders for the Geneva plant on May 1. (THE IRON AGE, May 9, 1946, p. 96)

Continuing a quotation from Mr. Berge's book: "Subsequently Mr. Landahl referred to a letter, written in 1922, which he had received from Vickers, Ltd. of Great Britain, stating: '. . . . we foresee the possibility of this scheme being hindered in its operation through the action of the U. S. Steel Corp. and we feel that we should have more information as regards their views for or against this proposal.' "

THE author then quotes Senators O'Mahoney, Truman and Kilgore:

"Senator O'Mahoney: 'It seems to me that the last paragraph as I was about to say is a very eloquent testimonial to the manner in which the large group operates internationally to restrain development and concentrate control throughout the world of the natural resources upon which the lives of the people depend.'

"The Chairman: (Senator Truman) 'It fits into the aluminum and Standard Oil group procedure, all of which we have had right before the Committee. This is just another link in the same chain.'

"Senator Kilgore: 'It is a sort of unwritten cartel.' "

Local supporters of the bid for Geneva entered by U. S. Steel have been concerned about the Dept. of Justice's antitrust views and the above quoted sections of Mr. Berge's book give them further cause for worry.

Continuing his review of western steelmaking facilities, Mr. Berge states:

Regardless of what the reasons have been for the lack of development of western steel producing facilities, the existence of basic steelmaking capacity is now an accomplished fact. Furthermore, studies by government agencies, the Western Steel Committee, several recognized engineering firms and private steel companies themselves indicate that both of the new large-scale steel producing plants in the West (Geneva and Fontana) can be operated by private owners on a basis which will show a reasonable profit to operations and at the same time reduce the price differential which western steel buyers have had to pay. There are, however, two important 'ifs' plus the necessity for a careful distinction between 'can' and 'will.'

"The first 'if' relates to the amount and terms which the government will exact for its property. Overhead costs are an extremely important element of total costs in the steel industry. This fact, together with the fact that substantial new investment is required to fit wartime plants to postwar uses makes it essential that new operators not be saddled with excessive overheads. Primary consideration must be given to prospective earnings in determining the sale or lease value of government-owned plants. The Surplus Property Ad-

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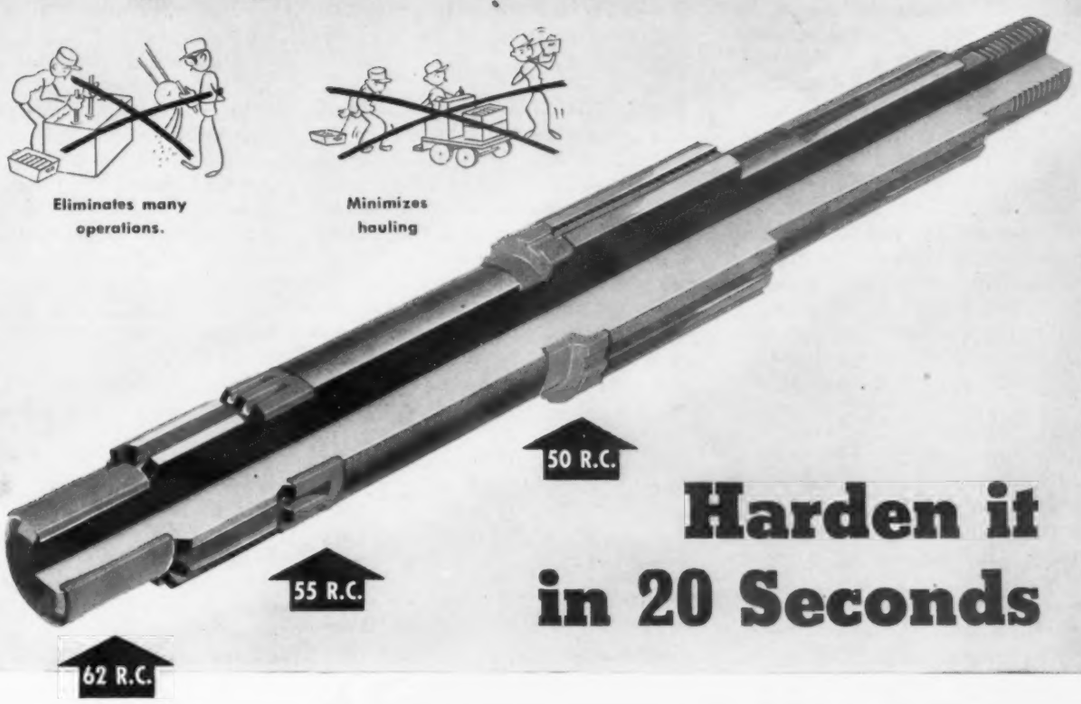

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INDUCTION

HARDENING, BRAZING

ANNEALING, HEATING

ministrator has recognized the importance of this point in his iron and steel report to the Congress. Consequently, there is reason to hope that financing arrangements with the government will take adequate cognizance of this same fact. It is now rather generally understood that the West cannot expect to benefit fully from competition until excessive financial overheads are reduced.

"The second 'if' pertains to the railroad freight rates from the Geneva, Utah, plant to West Coast markets. It is of basic importance that these rates reflect the competitive advantage of location at Geneva by bearing logical relationship to transportation costs which exist from this area to the Coast on ore, pig iron, and cast iron pipe, all of which have moved from the Utah region. This means that freight rates on finished steel products cannot be maintained at a level more than twice as high as freight rates on pig iron or iron ore. Obviously, high transportation rates for finished steel from Geneva to the West Coast where 75 pct of the western steel market exists is a vital limiting factor, since no commercial rates have as yet been established."

Thoroughly documented and containing many tables of interest, Mr. Berge's book is attracting many readers in the business world.

* * *

UTAH interests are openly and actively urging War Assets Administration to accept U. S. Steel's bid. Governor Herbert B. Maw, Senator Abe Murdock, Representative J. W. Robinson, the Chambers of Commerce of Salt Lake City and Provo are among those who have publicly stated their preference for the corporation's offer contending that it is the one most likely to assure operation of the plant.

It is believed by observers that if the corporation's bid is rejected and the plant then fails to operate, the situation will become an issue in the political campaigns in Utah. It is reported that the Republicans who haven't won a major office since 1930 believe that they could make political capital out of the situation if the Administration turns thumbs down on U. S. Steel and other plans for operating the plant fell through. They contend that they could convince voters that an idle plant which might have been operating doesn't qualify as a social gain. However, even the Republicans who foresee this political possibility are sincerely promoting sentiment in favor of the corporation's bid.

* * *

LOS ANGELES — All outstanding rights and interests in the Eagle Mountain iron ore mine in Riverside County, 130 miles from Fontana, have been acquired by Kaiser Co., Inc., Iron & Steel Div., it has been announced.

Tests made by the U. S. Bureau of Mines indicate a large volume of high quality ore which covers an area seven miles long and which is said to be sufficient to assure the Fontana plant continual operation for approximately 50 yr.

This mine was originally known as the Iron Chief and was reportedly purchased from original locators by the Harriman railroad interests. Harriman subsequently sold the mine to the Southern Pacific Land Co. which held it for many years. Kaiser Co., Inc., acquired title to the property in 1944 from the Southern Pacific Land Co., but subject to an outstanding lease and sale agreement. Acquisition of title announced recently makes possible large-scale mining operations at an early date.

Nail Supply May Fall Short of 1946 Needs By About 182,000 Tons

Washington

• • • **Indicated shortage** of wire nail production for 1946 and 1947 is causing great concern not only to housing officials but to the Dept. of Agriculture as well where the situation already affects shipping of fruit packages.

Latest overall figures indicate 1946 minimum nail requirements to be around 795,000 tons against an estimated supply of 613,000 tons, or a deficit of about 182,000 tons.

The 1947 outlook is no more encouraging. Requirements for the year are forecast at approximately 835,000 tons with production expected to reach no higher than 654,000 tons, resulting in a 1947 shortage of 181,000 tons. Officials, who decline to be quoted because of the obviously unstable factors concerned, say the supply figure for 1947 is based on the assumption that early 1946 monthly levels can be reached and maintained throughout next year.

The foregoing estimates were made after the steel strike but before stoppage of mining operations. Some current estimates place the May loss in nail output at as much as 25,000 tons, even had a coal agreement been reached by the middle of the month.

It is felt that a substantial shift may have occurred in the product mix of wire producers to permit them to take advantage of the relative profitability of certain other items. In view of the excess of demand over supply, it is officially believed that producers may be shifting to more profitable items at the expense of less profitable nails.

Industry has reported to CPA that an additional price increase is necessary to induce higher production. While its two price increases were substantial and above average, producers say the total does not yet compensate for increased costs. A proposal that the price be increased another $10 has been advanced by the industry which, it is reported, CPA feels is reasonable. OPA is not believed to be receptive to a further increase, however, feeling that consideration of nails as a low-end item would result in similar requests for other low-end steel items and thus complicate the overall steel program.

To Buy Witherbee Stock

Cleveland

• • • **Republic Steel** Corp. has purchased from the National City Bank of New York all Class A, Class B and Class C stock of the Witherbee Sherman Corp., owned by the bank, at $2.75 per share. Witherbee Sherman Corp. owns iron ore properties near Port Henry, N. Y., and a concentrating plant at Port Henry which Republic leased in 1938.

Republic is offering to purchase all Class A, Class B and Class C stock in the hands of other owners at the same price. Letters have gone out to all Witherbee Sherman stockholders making this offer.

10 to 1

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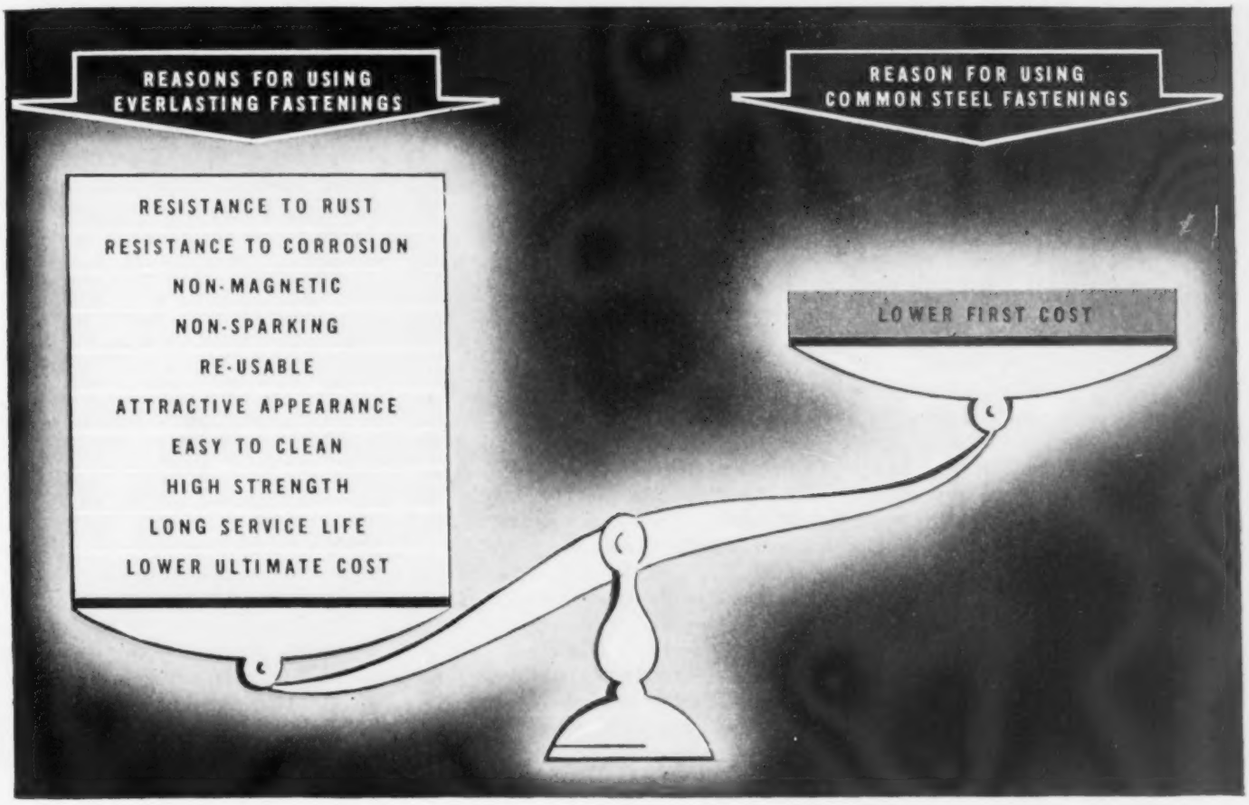

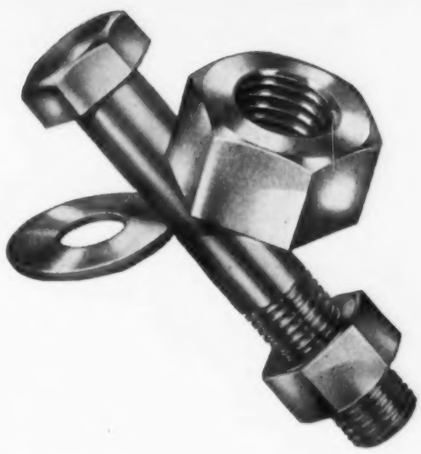

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European Letter . . . JACK R. HIGHT

• International steel cartel is on the way . . . U.S. State Dept. will probably meet fait accompli in efforts to avoid combine.

LONDON — Rumors are flowing free that conversations now being held will begin reestablishment of the series of international marketing agreements that the world knew before the war as the steel cartel. Whether the rumors be true or not, we can be sure that few people over here will willingly apply the name "cartel," even if the body exists. Although the system still has its merits to the European mind, the word has developed a flock of undesirable connotations that make it unthinkable.

It would be difficult to prove in court today that there is in existence a single marketing agreement in regard to a steel product line, but it is not too difficult to show logically that in all probability the agreements are being drawn up. Some seem likely to have been completed.

No one in authority here will venture any kind of official statement on the subject of cartels, for a number of reasons. The Labor Party now in power in Britain has condemned industrial cartels on many occasions in the past, and there are strong elements in the turbulent French political scene which are opposed to cartels. There is also an underlying awareness that the American State Dept. is looking with a somewhat unfavorable eye upon the establishment of such "gentlemen's agreements."

It is not difficult to find persons in responsible jobs here who are willing to express "off-the-record" semi-official views on the subject generally, if one does not press them too closely for specifics on what is happening.

The basic element to keep in mind as far as the European steel industry is concerned is that up to 1939 the cartel was the "approved, standard and logical" method of doing business. The only reason we could properly assume that the cartel would not be reestablished as soon as feasible would be that something had happened since 1939 to drastically revise the thinking of steel sellers. I do not believe that any such thing has happened as far as steel producers and sellers are concerned.

Compared with its domestic markets, Luxemburg was before the war the largest steel exporter. It has historically furnished much of the impetus for the establishment of marketing agreements, as well as the headquarters. I think that today the same country is the most anxious to see the cartel once more a going concern. Not only does Luxemburg's steel industry depend largely upon exports, but the country itself has no other big export. Steel is the national fortune. And the men who direct that steel industry believe strongly that only by international agreements with other producers will they be able to hold their place without excessive price cutting in a highly competitive market.

The same general factors apply to the Belgians, who are important exporters, although the nation as a whole depends considerably less on direct steel exports than does Luxemburg. The historic explanation of Belgian participation in the prewar cartel was that although the producers were inclined not to join, their shareholders (some writers say the Belgian banks) insisted that they sign. Continentals today say that the same factors will operate in Belgium today.

In France the position of the men who directed the domestic cartel and participated in the export agreements is still inextricably tied up with French politics. The elements still exist for full French participation, if the government chooses to smile upon the operation. But the accusations of "collaborationist" and "Vichyite" have yet to be resolved, and only a fool would predict today whether the prewar leaders will be allowed to resume where they left off in 1939.

If the French Government does choose to cast out all the prewar direction of the French steel industry, there is still no definite indication that such a revolution would alter the policy on cartels.

British steel men are determined to play their part in the world export market. They decided in 1933 after years of deliberation that the correct way to carry on steel exporting was through the device of a cartel. They are probably still of the same mind.

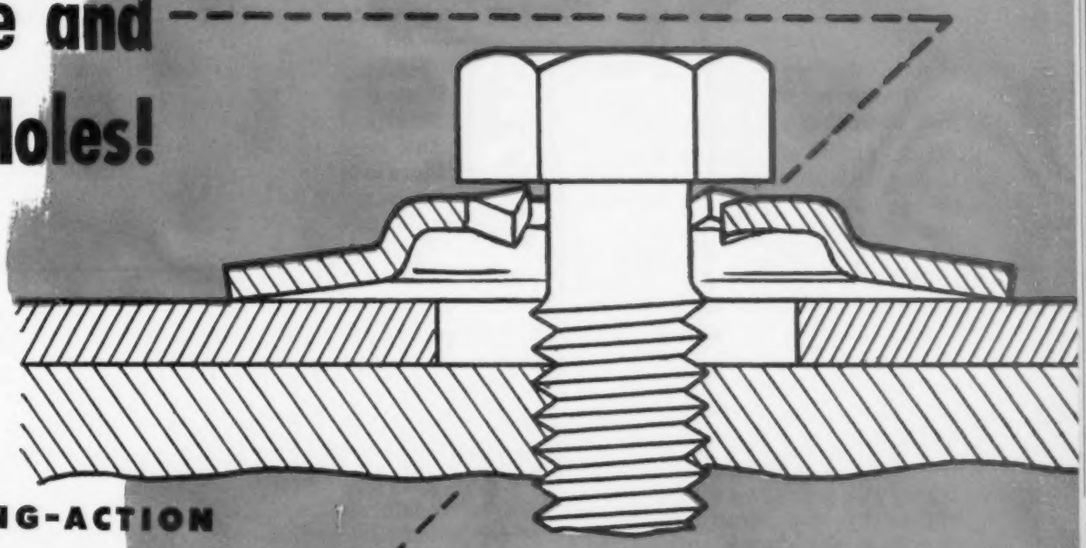
I recall from the international business conference at Rye, N. Y., in 1944 that there was considerable behind-the-scenes chatter about the existence of "good cartels." The British position then, as I recall it, was that such arrangements should be under some measure of government surveillance, but so operated can be beneficial. No American opinion otherwise has changed their views.

It will not be difficult to say now that the British would be in a position to sign up today, in spite of the nationalization proposal. The Labor Minister of Supply, Mr. John Wilmot, who holds the reins on the nationalization question, did say at the time of the announcement that under government ownership the industry would join in with "current world marketing practice."

Thus, if the British Iron & Steel Federation is able to convince the Minister today that world marketing practice in steel is through the medium of a cartel, then presumably the Federation can sign such agreement and feel secure in regard to its future.

Prewar experience in drawing up both the individual product agreements and the overall cartel agreement for steel gives ample evidence that at least in the steel business such agreements are somewhere near as laborious to negotiate as a peace treaty. Designed fundamentally to restrict competi-

For Oversize and Elongated Holes!



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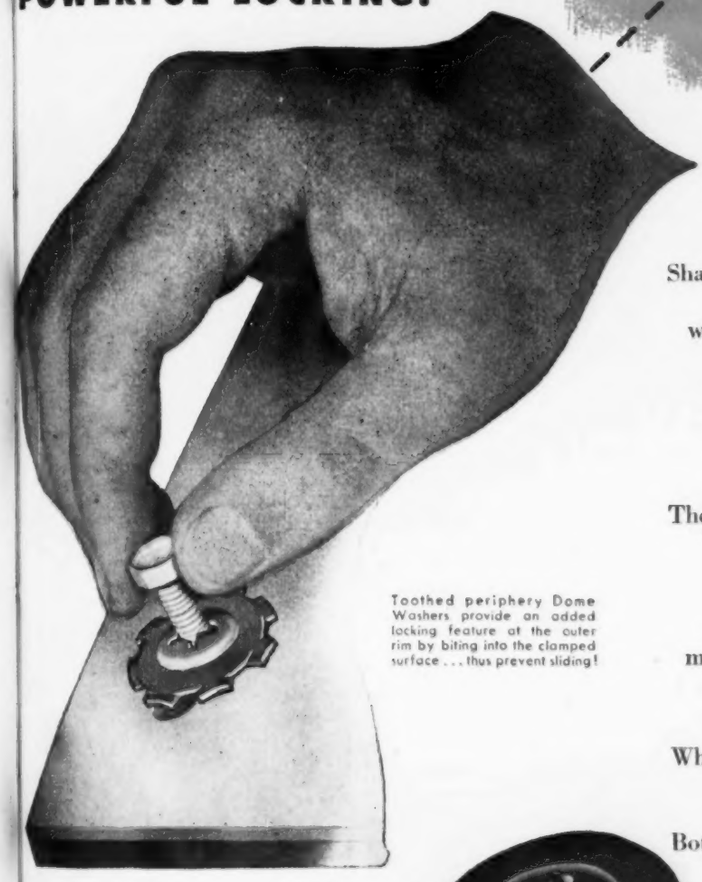
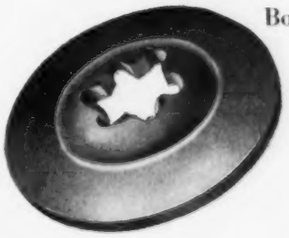


Toothed periphery Dome Washers provide an added locking feature at the outer rim by biting into the clamped surface . . . thus prevent sliding!



Plain periphery Dome Washers provide a frictional lock on hardened surfaces that resist bite.

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tion in the export market, there are differences of opinion today on just when they are best drawn up.

One group of steel experts in London tells me that obviously with no one having enough steel to sell, and all purchasers clamoring for deliveries, there is little incentive to the establishment of restrictive marketing agreements. There can be no doubt that the steel shortage is real, and it seems likely to last for a matter of years. But as to the matter of drawing up a cartel today, other sources advise me differently.

You will remember that the prewar cartel was largely the outgrowth of the chaotic competition of 1930-1931, when the export prices of most steel products went far below any reasonable cost of production. The cartel was formed as soon thereafter as agreement could be reached. Thus it was in the thirties an instrument, born of desperation, in a greatly exaggerated buyers' market, was drawn up at the bottom of the graph of depression sales.

In a hypothetical example, if we assumed that in 1950 we have satiated today's demand for steel and have a mild surplus of steel, with keen but not acute competition for the world's market, it would probably be most difficult to draw up a cartel agreement. All parties would be so keen to protect and expand their position that negotiation for allocating markets would be almost impossible.

Thus in a fairly normal situation, agreement on an international basis would be hard to achieve. If we go to the other extreme from 1932, to a situation where there is plenty of demand and no one in a position to fulfill much of it, we again may possibly find the world's producers able to agree on a cartel. If there is no keen competition, if all producers are basking in the light of reflected openhearths, and if they are worrying only about increased output, they can agree on restrictions more easily. Taking a long term viewpoint they can calmly agree on dividing the future markets, without affecting today's pocketbook or unemployment, or the dozen other factors that become annoying when times are tough.

All of which present the opposite viewpoint, that 1946 is in fact an ideal year to draw up a steel cartel. I am personally convinced that the latter is true.

From the opposite side of the Atlantic there is today no organization legally equipped to enter into such negotiations, under the restrictions of the Sherman Act and the Webb-Pomerene Act. The Steel Export Assn. went out of existence at the beginning of the war, and the clouds of distrust and Thurman Arnold hang heavy over would-be American postwar cartelizers.

Hunger Strike of Ruhr Coal Miners Will Be Felt Outside Germany

London

• • • **No European steel** producer can be considered in these days of reconstruction and planning to be master of his own fate. In prewar days the enterprising steelmaker was the one who had the contacts with raw material producers to get what he needed, the plant in which to produce it, and the sales organization to dispose of his production. Today it is at the allocation table and within the government ministry precincts that the decisions are made, directly or indirectly, on industrial production.

The steel industry of Luxemburg, seventh largest producer in the world before the war, is now finding itself at the mercy of the big power planning agencies that allocate the supply of fuel for Europe. The effect of coal allocations on production of steel in all the European countries is so direct at present that no study of present production figures in any country is worth while unless they are considered in light of the potential if adequate fuel were available.

Steel officials in Luxemburg felt optimistic in the summer of 1945 that a very few months would find them back at near prewar output levels. All of the prewar factors were there for substantial production. But they reckoned without the outcome of coal and coke availability and allocations as devised by the military government in Germany and the European Coal Organization.

Steel production in Luxemburg is completely dependent upon imported coke, nearly all of which is imported from Luxemburg-owned mines in the Ruhr. In the face of an international fuel shortage Luxemburg finds that it is allowed no more than a basic 30 pct of its prewar imports of coal in the division that is made.

This limitation means that the steel industry is effectively checked at far below its potential capacity due to a shortage of coke. Not only is it operating at below potential, which is common in all of Western Europe, but due to the vagaries of the allocation plan the Luxemburg industry is operating at far below the average of industrial activity for the area. The reaction of steel executives is bitter, just as it is in France, where coal imports are also controlling steel production.

The reduction of rations in the Ruhr due to the grain shortage has contributed an added measure of chaos to the fuel picture as coal production in the Ruhr is allowed to drop off rapidly, on the pretext of a shortage of food. Continental experts assert that the Germans running the mines have laid down an edict of "No food, no coal" to the British occupying authorities, and have gotten away with it.

The Europeans preach that just the opposite should be applied, with the occupying authorities saying, "No coal, no food."

Whatever the situation, output from the pits fell rapidly from the first week of the ration cut, and has only recently stopped its succession of losses. Coupled with the strike in America, the result of the hunger strike has been a 25 pct cut in basic allocation of coal to all importers.

Berlin reports indicate that although the coal drop in the Ruhr due to the "hunger strike" has amounted to only about 10 pct in the total tonnage, the Four Power Government has used the drop as an excuse to reduce the availability of coal for export from Germany by 25 pct. Thus it may be that the direct result of the hunger strike by Ruhr miners has meant 15 pct more coal for Germany. If such be the case, no one will know it better than the

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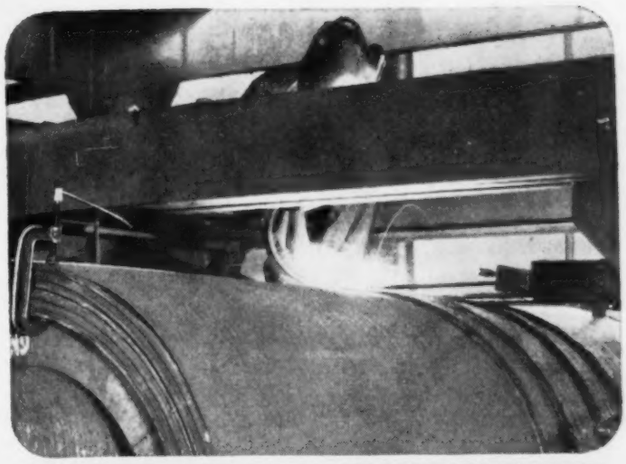

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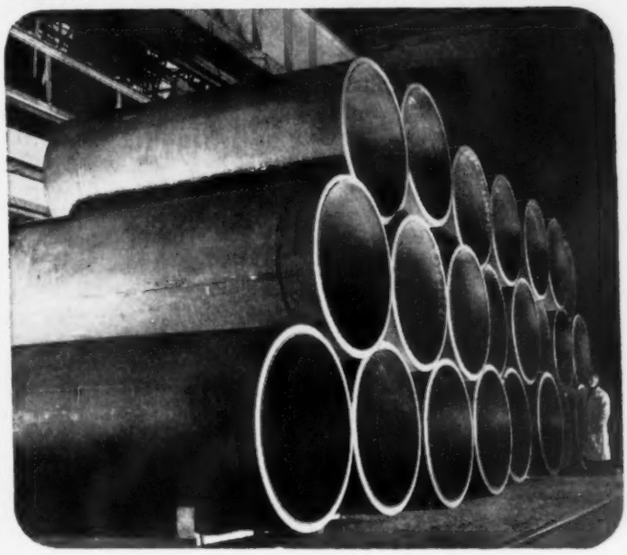

1946 Operating pressures, above 5000 p. s. i., together with the increased safety demanded by the chemical processing industries for wartime needs, were met only by mass production of SMITHway Multi-Layer vessels.

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PERSONALS

o o o

• **E. G. Hardig,** sales executive of National Tool Co., Cleveland, has been appointed sales representative of the organization in the Michigan territory with headquarters in Detroit. With the company for 15 yr, Mr. Hardig's territory was the Michigan area until 1943, when he was drafted by National Tool to serve as general sales manager during the stress of war years.

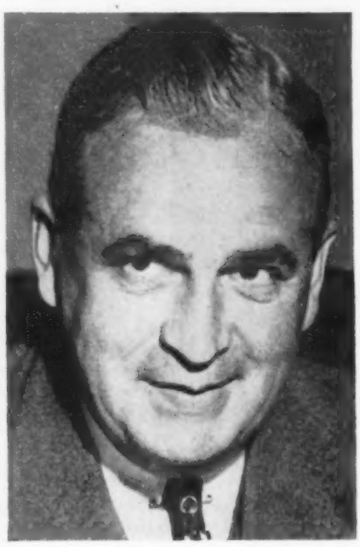
• **C. R. Mabley** will retire from the sales staff of SKF Industries, Inc., after 31 yr of service, effective as of June 1. Mr. Mabley joined the company in 1915 and for a number of years was manager of the Detroit district office. Since 1941 he has been priorities manager in the home office in Philadelphia.

• **Gilbert H. Krohn** has been appointed manager of sales of the Detroit district sales office of Globe Steel Tubes Co. For several years he has been assistant district sales manager for the company's office in Chicago. Mr. Krohn succeeds **Arthur A. Loeffler** who is retiring after more than 25 yr of service with the Globe Steel Tubes Co. **Willard C. Christianson,** whose title has been assistant to vice-president in charge of sales at the general sales office in Milwaukee, has been transferred to the Chicago district sales office as sales agent succeeding Mr. Krohn. **Frederick K. Krell** has been appointed sales service supervisor to succeed Mr. Christianson.

• **Keith J. Harris,** secretary and treasurer of the Ross-Meehan Foundries, Chattanooga, Tenn., has been elected vice-president in addition to his present title, and **Herbert L. Suplee,** assistant sales manager, has been named vice-president in charge of sales. Mr. Harris has been with the company since 1926 and Mr. Suplee since 1935.

• **E. B. Carpenter** has been appointed district sales manager of the American Car & Foundry Co.'s St. Louis office, succeeding **L. W. Martin** who has retired. Mr. Carpenter entered the employ of ACF in 1927 and was appointed sales agent at the St. Louis office in 1940.

• **Wynn G. Winkler** has been named chief refrigeration engineer of the Parts Div., Reynolds Metals Co. in Louisville. Before joining Reynolds, Mr. Winkler was chief refrigeration engineer of the Brunswick-Balke-Collender Co., Muskegon, Mich. Earlier he served as a product engineer with the Frigidaire Corp. and as a factory superintendent and assistant to chief engineer of the Kold-Hold Mfg. Co.



J. E. BUTLER, comptroller, Columbia Steel Co.

• **J. E. Butler,** former assistant comptroller of Columbia Steel Co., has been elected comptroller of the company, a U. S. Steel subsidiary. He succeeds **C. T. Redmond,** resigned. Prior to taking up his new duties with Columbia Steel, Mr. Butler was comptroller of Geneva Steel Co.

• **George R. Wernisch,** assistant manager of the Concrete Engineering Div. of Ceco Steel Products Corp., has been appointed manager of the firm's Steel Joist & Roof Deck Div. He will make his headquarters at Ceco's general offices and plant No. 1 in Chicago.

• **Hood Worthington,** who has been on assignment for the last 3 yr at the Hanford Engineer Works, which the E. I. du Pont de Nemours & Co., Wilmington, Del., operates for the government, has been appointed assistant director of the recently organized engineering research section, Rayon Technical Div.

• **Ralph C. Berg** has been named production manager of Le Roi Co., Milwaukee. He has been with the company for the past 3 yr, in which time he has been assistant production manager and most recently, assistant plant superintendent.

• **V. H. Peterson** has been appointed manager of the Railroad Div. of Fairbanks, Morse & Co., Chicago. Mr. Peterson had formerly been assistant to the president and manager of the New York office of the Baldwin Locomotive Works, which position he held until a month ago when he joined the Fairbanks-Morse organization as assistant to **John W. Barriger, III,** who has resigned to become president of the Monon Railroad.

• **Stanley D. Means** has been appointed to the newly-created position of domestic sales manager of R. G. LeTourneau, Inc., of Peoria, Ill. He has been affiliated with the sales dept. for the past 10 yr.

• **M. G. Sedam** has been named vice-president in charge of research and production of Alloy Rods Co., York, Pa. He has been associated with the company since 1943 as director of research.

• **Charles R. Ince** has been appointed manager of metal sales of St. Joseph Lead Co., New York, and **Dwight Marshall** has been named assistant manager. **Andrew Fletcher** has become executive vice-president; **Francis Cameron,** vice-president; **George I. Brigden,** treasurer; **Robert Bennett,** secretary; and **Charles Fleig** and **James G. Colvin** have both been made assistant treasurer and assistant secretary.

• **Charles A. Marshall** has been appointed general manager of Iron & Steel Products, Inc., Chicago. **George L. Bladholm** has been appointed special representative.

• **George Bottcher** has been made construction engineer for Allegheny Ludlum Steel Corp., Brackenridge, Pa. He came to Allegheny Ludlum in 1940 as a member of the engineering staff. Previously, he had worked with the Bureau of Yards & Docks, Navy Dept., and with the Construction Div. of the War Dept.

• **Colin R. Grant** has been appointed purchasing agent of Michigan Seamless Tube Co., South Lyon, Mich.

• **Alwin A. Gloetzner** has been selected to head up the new southeastern territory for the New Departure Div. of General Motors Corp. Mr. Gloetzner has been in charge of New Departure's Washington office and will continue to make his headquarters there.

• **H. L. Cushing** has been named district sales manager of Edison General Electric Appliance Co. in Dallas. Other district managers appointed are: **W. R. Hall,** Boston; **S. J. Houston,** New York; **D. H. Risher,** Charlotte, N. C.; and **W. A. Summers,** Buffalo. **L. O. Braun** has been appointed sales promotion manager for the eastern region, and **W. W. Gibbs,** southern region.

• **Lt. Stanley E. Wolkenheim,** U. S. Navy, has been appointed sales manager, Water Heater Sales Div., Edison General Electric Appliance Co., Chicago. Before entering the Navy, he was with the company in the treasury dept. and was manager of the company's Buffalo branch.

• **Harold B. Newell** has been appointed budget director of the Mfg. Div. of the Crosley Corp., Cincinnati. For the past 2 yr he has been comptroller of Kaylon, Inc.

• **Anthony J. Stremble,** for 30 yr drafting supervisor of the Foster Machine Co., Westfield, Mass., has retired.

• **Paul W. Heasley** has been elected assistant treasurer of the Graham-Paige Motors Corp., Detroit. He formerly was assistant treasurer of Triumph Industries, Inc., Elkton, Md.

FRANCIS X. WIGET (left), secretary, and J. E. McWILLIAMS (right), general purchasing agent, Blaw-Knox Co.

• **Francis X. Wiget** has been elected secretary of the Blaw-Knox Co., Pittsburgh. Mr. Wiget has been a member of the law dept. of the company for the past 5 yr. In addition to his new duties as secretary, he will continue as assistant general counsel of the company. **J. E. McWilliams** has been named general purchasing agent of Blaw-Knox. He has been with the company for the past 26 yr, and until his present appointment was purchasing agent of the Blaw-Knox Div. He succeeds the late Walter Nuttall.

• **John H. Prout** has joined the Detroit office of Acme Steel Co. For 17 yr Mr. Prout was associated with the Morrison Stitching Machine Div. of Harris-Seybold-Potter Co., which division was recently acquired by Acme Steel Co.

• **Gordon W. MacKinney** has been made assistant manager of the installations dept. of the Curtiss-Wright Corp., Propeller Div., at Caldwell, N. J. Mr. MacKinney has been associated with the Propeller Div. since 1942 as an installation engineer and for the past 2 yr has supervised commercial installations. He was formerly associated with the International General Electric Co. in New York.

• **Arthur J. Eaton,** assistant treasurer of the J. I. Case Co., Racine, Wis., has retired after 34 yr association with the firm.

• **B. A. Evans** has been named manager of the wheel and brake manufacturing dept. of the B. F. Goodrich Co., Akron, Ohio, and **R. J. Keller** has been made technical manager.

• **Harry J. Halliday,** formerly assistant purchasing agent for the Jeffrey Mfg. Co., at Columbus, Ohio, has been appointed purchasing agent. He has been with the company 35 yr.

• **William L. Jenkins** has been appointed manager of the recently created electronic applications development dept. of the B. F. Goodrich Co., Akron, Ohio. He joined the company in 1940 and for the last several years had been an experimental engineer. **W. F. Billingsley** has been named manager of tire construction of the B. F. Goodrich Co. He was manager of tire testing from 1933 to 1941 and had been assigned to special tire development problems during the war.

• **Herbert H. Roosa** has been appointed sales manager of Manzel Bros. Co. of Buffalo. Mr. Roosa for the past 10 yr has been associated with the sales dept. of the Niagara Machine & Tool Works.

• **J. J. Schmidt** has been appointed superintendent of the Landis Machine Co., Waynesboro, Pa., succeeding J. G. Harper.

MATTHEW R. ROSSE, export manager, Colorado Fuel & Iron Corp.

• **Matthew R. Rosse** has been appointed export manager for the Colorado Fuel & Iron Corp., New York, including all divisions and subsidiaries. Mr. Rosse has been export manager of Wickwire Spencer Steel, a division of CF&I since 1943. Previously he was associated with the American Chain & Cable Co.

• **L. W. Graaskamp** has been named general sales manager of American Can Co., New York. He joined the organization in 1920 and in 1934 became assistant district sales manager of the Packers' Can Div. He was transferred to New York as assistant general sales manager in 1944.

• **Edward R. Williams,** formerly president, and **David P. Williams,** formerly vice-president, are no longer connected with the Vulcan Mold & Iron Co., Latrobe, Pa.

• **Harry Patton,** director of sales, service and advertising of the Indian Motorcycle Co., Springfield, Mass., for the past 3 yr, has resigned. His work will be taken over temporarily by Ralph B. Rogers, president.

• **Maj. Joseph P. Somers,** recently discharged from the Army, has joined the Philadelphia sales office of the Wyckoff Steel Co.

• **Robert Wardrop** has been made assistant manager of glass advertising and promotion for the Pittsburgh Plate Glass Co., Pittsburgh. Prior to his service with the Army, he was manager of the firm's Duluth, Minn. warehouse for more than 3 yr. **Clarence E. Ralston** has retired as safety director of the company. Mr. Ralston has been associated with the glass company's safety dept. for more than 23 yr. Prior to his association with Pittsburgh Plate Glass, he held the position of assistant safety engineer with the Jones & Laughlin Steel Co.

• **B. W. Rogers** has been appointed Akron, Ohio district representative of Hammond Iron Works, Warren, Pa.

• **Howard Fogg,** former AAF fighter pilot, has been appointed art consultant of the American Locomotive Co., New York.

ROY A. EGELHOFF, sales representative, Titan Metal Mfg. Co.

• **Roy A. Egelhoff** has been appointed sales representative of Titan Metal Mfg. Co., Bellefonte, Pa., for Iowa, Kansas, Missouri, southern Illinois and southwestern Indiana, with offices in St. Louis.

• **Thomas H. Fawcett** has been appointed sales engineer for the Locomotive Div. of the Vulcan Iron Works of Wilkes-Barre, Pa. Before going with Vulcan, Mr. Fawcett was connected with the Baldwin Locomotive Works, serving successively as draftsman, designer, engineer and sales engineer in their Locomotive Div., for nearly 30 yr.

...OBITUARY...

• **James L. Morse,** 62, mechanical engineer in the Bureau of Reclamation Branch of Design and Construction at Denver, died May 5, following an emergency operation.

• **Vere B. Edwards,** 56, president of Dravo Corp., died May 8 while attending a meeting of the executive committee of the corporation at its Neville Island plant, Pittsburgh.

• **Charles E. Price,** in recent years operator of A. C. Buckley Co., North Attleboro, Mass., and formerly superintendent of the Sword Div. of the Ames Sword Co., Chicopee, died recently.

• **Harry Erickson,** 55, production manager for International Harvester Co., Milwaukee plant, died May 4.

• **William H. Bacon,** 74, former president of the Boston iron and steel firm of Bacon & Co. died at York, Me., May 10. He retired in 1934.

• **Richard C. Harrison,** 76, treasurer of the abrasive manufacturing firm of Harrison & Co., Inc., died at Haverhill, Mass., May 9.

• **Bernard C. Ziegler,** 62, one of the founders and active head of the West Bend Aluminum Co., West Bend, Wis., since 1911, died May 8 after a short illness.

• **Edmund D. Barry,** associated with Universal Atlas Cement Co. for 40 yr prior to his retirement in 1943, died May 6 at Alameda, Calif. He had been superintendent of company plants at Pittsburgh and Chicago, assistant operating manager at Chicago, and prior to his retirement, manager of industrial relations in New York.

• **John E. Kordenbrock,** 72, Lodge & Shipley Machine Tool Co. demonstrator for 47 yr, died at his home in Cincinnati recently.

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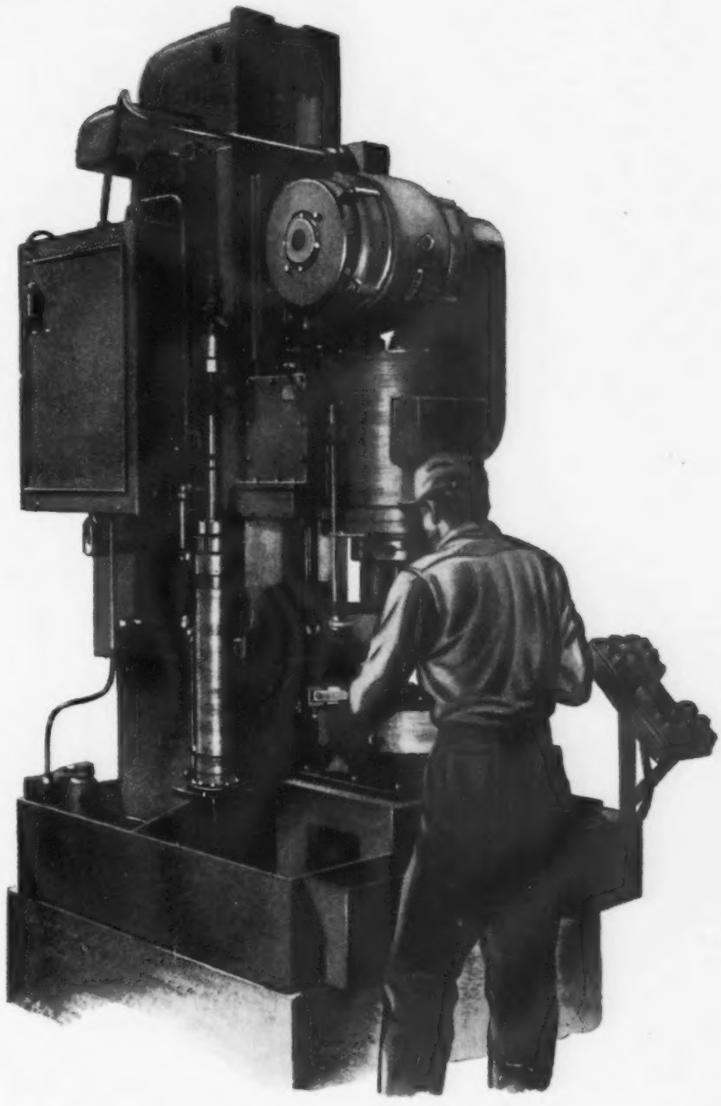

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Scales • Motors • Pumps • Generators
Magnetos • Stokers • Railroad Motor
Cars and Standpipes • Farm Equipment

Dear Editor:

TUBES FOR 2000°F

Sir:

We have read with considerable interest the letter in "Dear Editor" in the Apr. 25 issue from Danciger Oil & Refining Co. While we agree that AISI 310 stainless is a perfect metal for this application, we are far from satisfied with your list of suppliers. To the best of our knowledge we have manufactured the first 310 stainless tubing and probably even today are still manufacturing the most. . . .

J. A. DEITRICH
Metallurgical Engineer
Welded Alloy Tube Div.
Carpenter Steel Co.
Kenilworth, N. J.

ELECTRODE MOISTURE TESTER

Sir:

I see that R. O. Breuer of the Pasadena Dry Docks ("Dear Editor," Dec. 6, 1945) has asked for information regarding moisture determination in electrode coatings used by my firm. I should be pleased to give Mr. Breuer all information he requires if he will write me directly. The moisture determination equipment described in my paper is, I believe, available on the American market. . . . if it is not, I could give him addresses of laboratory equipment companies in this country who sell this equipment . . .

G. HAIM,
Research & Development Dept.
Arc Mfg. Co., Ltd.
London, England

● Moisture testers of the type discussed in reader Haim's article are marketed by Brabender Corp., Rochelle Park, N. J.—Ed.

NICKEL PLATING REFERENCE

Sir:

We would appreciate it very much if you will send any reprints or data that you might have pertaining to small black nickel plating procedure equipment and setup.

CHARLES STRECK
Plant Engineer
Hussman-Ligonier Co.
St. Louis 6

● E. I. duPont de Nemours & Co., Inc., has developed a process for small black nickel plating. Suggest you write their Electroplating Chemical Div., Wilmington, Del.—Ed.

X RAY TUBE MANUFACTURE

Sir:

Will you please send a copy of the article "Metallurgical Aspects of X Ray Tube Manufacture" by M. J. Zunick which appears in the Apr. 11 issue.

CYRUS A. POOLE
Manager—K Ray Products
E. I. du Pont de Nemours & Co.
Wilmington, Del.

HIGH PRESSURE FEEDING

Sir:

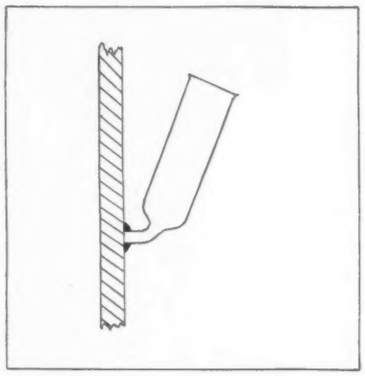
We would appreciate your sending us a few copies of the article "High-Pressure Feeding of Static Molds" as described in the Jan. 10 and 17 issues.

K. WITHEY
Process Engineer
Crucible Steel Casting Co.
Milwaukee

LOW MOLY DETERMINATION

Sir:

We have read your recent reference in "Newsfront," Feb. 7, 1946, concerning the qualitative testing for molybdenum in steels. Over the past years we have successfully applied the thiocyanate chemical reaction to this element, that is in the differentiation of 18 Cr-8 Mi-3 Mo-1 Ti and 18 Cr-8 Ni-1 W-1 Ti steels. An outline of this



procedure, as applied to bulk material, is as follows: Fix the adapter (shown in the accompanying illustration) onto the specimen, sealing the joint with plasticine. Add a few ml of conc. hydrochloric acid followed by a similar volume of conc. nitric acid. After the material has been sufficiently attacked, break the seal, catching the solution in a small breaker. Dilute well to inhibit the immediate effect of the nitric acid and add an excess of potassium thiocyanate solution followed by an excess of 30 pct stannous chloride solution. The ferric thiocyanate color is destroyed but the characteristic carmine-red color given by molybdenum is not decomposed under the conditions outlined.

This reaction may be applied "electrographically" although we have had limited experience in this direction. The material is "electrographed" for ½ min using dilute nitric acid. The absorbing paper is subsequently treated with aqueous potassium thiocyanate followed by sodium thiosulphate solution. A carmine-pink coloration located within or at the edge of the zone decolorized by the thiosulphate indicates molybdenum. The presence of 0.5 pct of this metal can be detected by this procedure. This method is capable of giving a positive reaction on steels with molybdenum contents as low as 0.15 to 0.25 pct, although a fair amount of experience is necessary in order to attain these limits.

W. T. ELWELL,
Analytic Section, Research Dept.
Imperial Chemical Industries, Ltd.
Billingham, England

● Our thanks to reader Elwell for those interesting notes. Incidentally, Townsend of Jones & Lamson Machine Co. has reported (The Iron Age, Apr. 11, 1946, p. 49), a modification of the qualitative spot test for molybdenum which permits the rapid separation of the NE and SAE 4000 steels from non-molybdenum types, as well as steels with high residual molybdenum content from steels to which molybdenum has been intentionally added, as NE 8600.—Ed.

K-46 STEEL?

Sir:

We are desirous of obtaining information and chemical analysis on a steel known as K-46. We would appreciate any help you can extend us.

W. P. WILLIAMS
National Steel Sales Co.
Seattle

● The closest we have been able to come to K-46 is the K-42b material of Westinghouse, and the KL, KM series of Universal-Cyclops. Perhaps some reader may be acquainted with the designation K-46 and will let us have the data to pass on to Mr. Williams.—Ed.

ALUMINUM ENAMEL COATING

Sir:

In the Jan. 31 issue on the "Newsfront" page, is an item mentioning that a vitreous enamel-coated cast aluminum is in the experimental stage. We are interested in this application on magnesium alloys and would like to know who is doing this experimental work.

A. MacLEOD,
Metallurgical Dept.
Dow Chemical Co.,
Midland, Mich.

● This experimental work is underway in several eastern foundries but the company developing the material is not yet prepared to make a general announcement.—Ed.

WHAT PRICE EVOLUTION

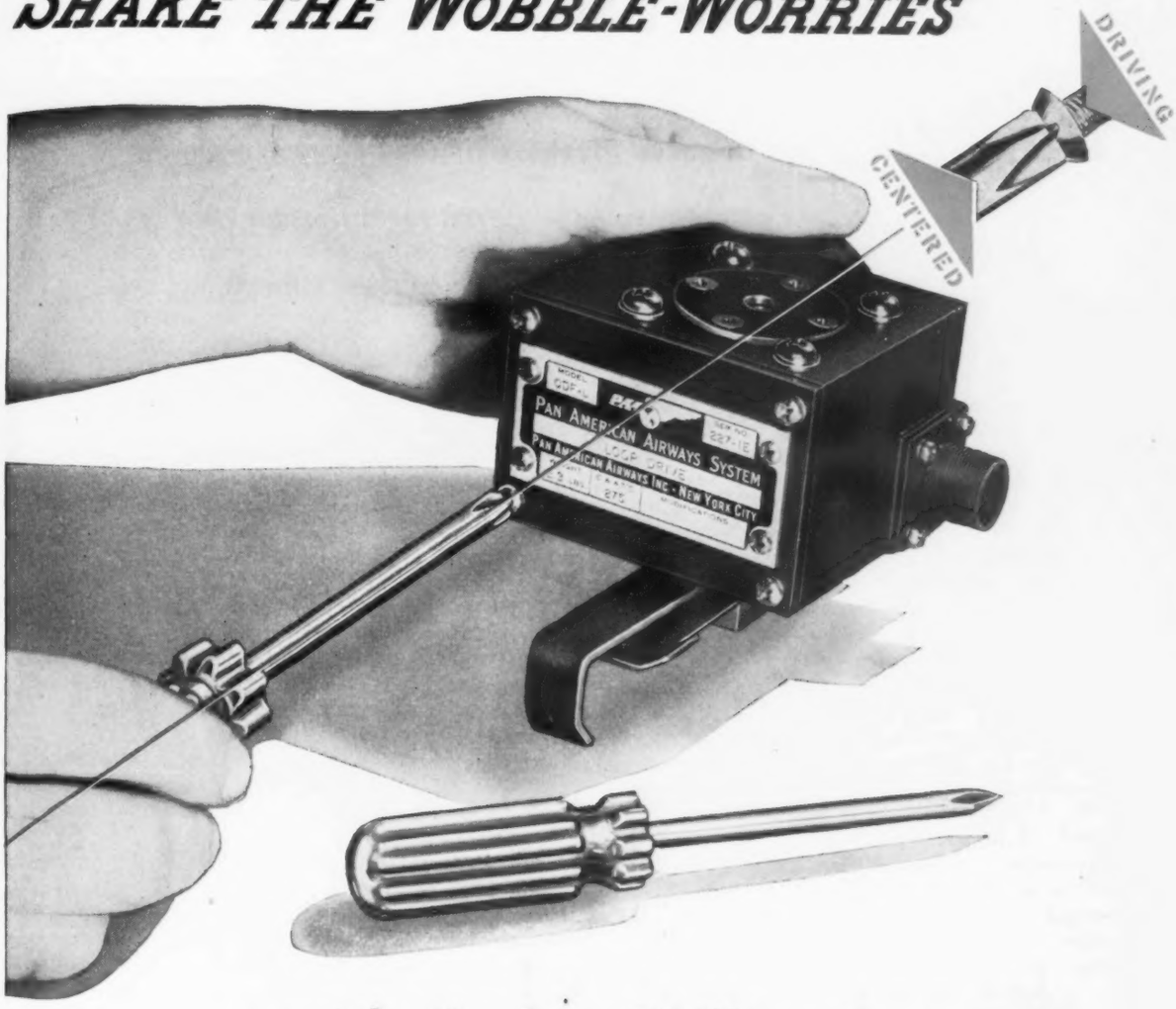
Sir:

In the issue of Mar. 28 there is an editorial called "What Price Evolution." Would you kindly give me permission to use this editorial in our company paper, *The Washburn News.* This is an internal publication.

J. R. LAWRENCE
Product Designer
Washburn Co.
Worcester, Mass.

● You have our permission.—Ed.

SHAKE THE "WOBBLE-WORRIES"



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Drive an ordinary screw and you'll get the "Wobble Worries" . . . fear that the driver will slip from the slot and jimmy up the product. Wobble Worries slow you down!

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This Industrial Week . . .

- ***Balanced Steel Distribution Being Wrecked***
- ***Months to Be Required for a Normal Flow***
- ***Government Takes Over Coal Mines***

A PROPERLY balanced distribution of steel, an absolute necessity for full peacetime production of products for which the public are clamoring, has almost been completely wrecked for the next several months at least. The damage inflicted on the flow of steel into major consuming channels by the steel strike has been so greatly exaggerated by the current coal impasse that makers of automobiles, household appliances, various consumer goods, construction material and industrial requirements will see many months pass before they will be able to obtain a complete and orderly flow of the parts necessary to step up their production programs.

Another major factor which stems from the steel strike settlement and which is causing a concentration on the production of some steel products and almost an elimination in the output of others is the steel price picture. Steel companies have been forced to produce those items on which the profit is greater in order to offset what they claim are unreasonable costs in the production of other items.

Although sharp curtailments have been made in steelmaking rates during the coal strike, cutbacks in finishing operations have been far more pronounced on steel products such as bars, reinforcing bars, plates and merchant pipe. Emphasis has been on the use of available facilities for flat-rolled material such as sheets and strip, for which the demand has been greater and on which the return is larger.

This situation has found many steel consumers able to get some flat-rolled material but unable to complete their production cycle because of the scarcity of other products flowing through their manufacturing lines. Until such time as OPA realigns price relationships to produce a comparable return across-the-board, the hard-boiled policy of concentrating output on some products and reducing production of others will stick. A reflection of this situation is the steady withdrawal of firms from the production of track spikes and bolts which after mid-year will prevent the railroads from buying sufficient fastenings to lay the rails which are being produced.

DURING the first week of the coal truce, shipments of coal to steel companies had no effect on steel operations but actually a drop occurred. This week, the second week of the truce, finds the steel ingot operating rate unchanged from last week at 49 pct of rated capacity. Even this rate may be revised subsequently because some plants were forced down completely on Tuesday of this week.

Now that the coal mines have been taken over authoritative sources now long familiar with the coal labor pattern definitely expect that the government will make a deal with John L. Lewis which will include a compromise on the health and welfare demand and a substantial increase in wages. Following that it would be expected that the government will, after a certain time, hand the mines back to the operators with the latter holding the bag.

THE terrific setback experienced by the steel industry since the first of the year has made it certain that the steel tonnage set up by governmental authorities for European rehabilitation purposes will not go abroad this year, although some token shipments may be made. Domestic steel demand is so far ahead of domestic production that steel salesmen abroad are twiddling their thumbs while some European countries are stepping up their own steel output for export purposes as well as increasing capacity.

Some normal export business is being carried on but it is a drop in the bucket compared with requests being received by steel companies in this country from almost every foreign location. Major steel firms are exporting steel on the same basis that applies to American consumers—a quota system based on prewar shipments. By the time the United States steel industry is in a position to supply substantial quantities of steel abroad, European steel mills and those in other parts of the world may have become greatly expanded and may be in a position to supply a good portion of what was once imported from this country.

As soon as the coal strike is ended, most mills will re-examine their quota allotments to customers for the last half of the year in order to determine how much must be eliminated to bring future commitments into line with anticipated production. Many mills have as yet made no decisions as to when their order books will be officially opened for 1947. It may be that most steel firms will begin to accept next year's orders by mid-year.

Although production of Tinplate for the food pack has been under top government pressure, removal of restrictions on Tinplate for other uses when the food situation has been taken care of may find producers not too eager to boost their output. Tinplate producers have fallen in line on the decision not to seek revision of this year's contracts to take into account the advance allowed by OPA, but there is evidence that they are not too happy about it.

The Scrap situation throughout the country remains tighter than ever this week. With the Coal situation still precarious Pig Iron supplies will be far from meeting demand and emphasis will still remain on the use of Scrap to replace unavailable Pig Iron.

• **STRIP PRODUCTION PAMPERED**—Because of top-heavy orders strip producers have favored this item over others in making production cutbacks. Shipments have been relatively well maintained to date. Nonintegrated producers have in most cases enjoyed the same access to available semifinished material as steel producers' own finishing departments. Nonintegrated customers of a Detroit mill are reported getting particularly good treatment.

• **RAIL PRODUCTION CONTINUES**—Although rail production schedules for the first half are far below the carriers' requirements, production has not suffered as much as some items during the coal strike. An exception, of course, is the Pittsburgh district where all products have been hard hit. Biggest worry currently is the unsolved problem of getting fastenings, with major producers withdrawing from the market.

• **SWEDISH ROLLING MILLS** — The government-owned steelworks at Luleaa has proposed the construction of two new rolling mills with a combined capacity of 300,000 tons. Pig iron capacity is to be increased from 100,000 tons at the beginning of last year to about 500,000 tons. A coke furnace with a 200,000 tons output will be the first step in this program. The Minister of Commerce has not yet passed on these proposals for the Norrbottens Jaernverk plant.

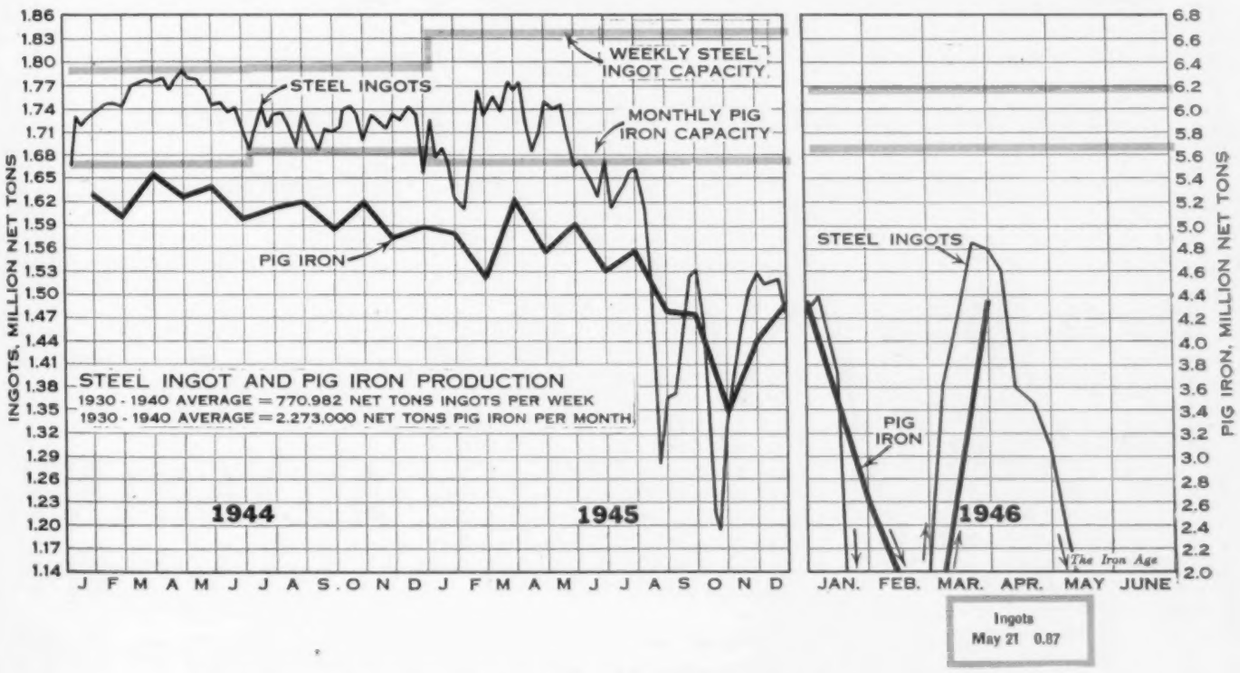
• **FERROALLOYS**—While the ferroalloy industry petitioned the OPA for increases in the price of ferrosilicon only, nothing has yet been forthcoming. The threatened railroad embargo created a panicky buying spurt that forced some producers to temporarily halt incoming orders. Producers now feel that it will be only a matter of a few months until ferromanganese and ferrochromium are imported from Russia, Norway and Sweden.

• **OIL COUNTRY TUBULAR GOODS**—A consistent and strong demand for oil country tubular products has extended backlogs to about five to six months. Producers are quick to point out, however, that production is high and the situation is a very healthy one. With about 28,000 wells expected to be drilled this year, stocks both mill and field, are pretty well cleaned out. The field stocks are, in fact, better than mill stocks, and it is quite likely that some mill stocks depots will never again be reinstated. Line pipe is probably the tightest item now, with drill pipe next.

• **BRITISH STEEL OUTPUT**—Steel production in the United Kingdom for April totaled 1,129,400 tons, compared with 1,059,900 tons in the same month last year. Pig iron output increased for the month with production totaling 666,100 tons, compared with 616,400 tons in the same month last year.

• **IRON ORE SITUATION**—Most of the independents in the iron ore labor impasse are still out, although Ogleby Norton men went back May 15. This brings the settlement to include Oliver, J & L, and Wheeling. Fundamental problem is the higher cost mines, which have been operating in some cases at a deficit for many months.

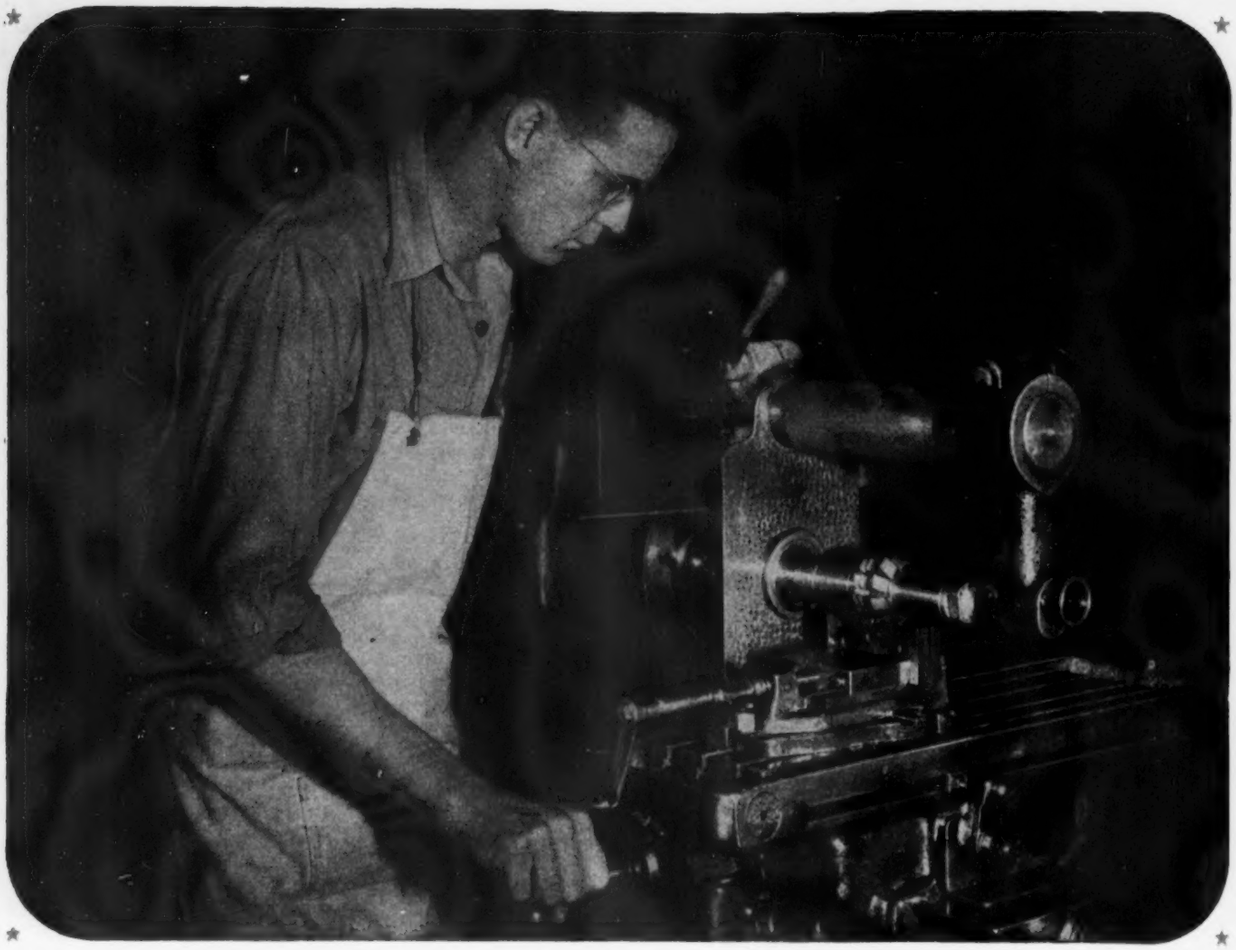
• **ADJUSTABLE COKE PRICING**—Producers and distributors of beehive oven coke are permitted to sell on an adjustable pricing basis beginning May 17, according to OPA. Adjustable pricing for byproduct coke producers became effective May 16. This action authorizes producers and distributors to collect present ceiling prices on the condition that the buyer will pay any ceiling increase subsequently granted by OPA to prevent current hardship or increases resulting from present coal mining negotiations. Most employees of beehive ovens are UMW members and will probably receive benefit of any wage increases granted miners which are retroactive; in addition, any coal cost increases will directly affect coke costs.


INGOTS, MILLION NET TONS
PIG IRON, MILLION NET TONS
WEEKLY STEEL INGOT CAPACITY
STEEL INGOTS
MONTHLY PIG IRON CAPACITY
PIG IRON
STEEL INGOT AND PIG IRON PRODUCTION
1930 - 1940 AVERAGE = 770,982 NET TONS INGOTS PER WEEK
1930 - 1940 AVERAGE = 2,273,000 NET TONS PIG IRON PER MONTH
1944
1945
1946
J F M A M J J A S O N D J F M A M J J A S O N D
JAN. FEB. MAR. APR. MAY JUNE
The Iron Age
Ingots
May 21 0.87

Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Bu alo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
May 14.....	43.0	48.0	38.0	45.0	77.0	38.0*	65.0	46.0	98.5	58.0*	69.0	53.0	78.0	49.0
May 21.....	41.0	50.0	28.5	41.0	76.5	35.0	59.0	46.0	95.5	59.0	69.0	59.0	86.0	49.0

* Revised



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STEEL CORPORATION

General Offices
Brackenridge, Pennsylvania

W&D 371

U. S. Government Closes In on Coal Strike— Seizes Mines

WHAT'S THE DOPE, JOHN? *John L. Lewis, UMW head, is telling reporters he will insist on a health and welfare fund to be included in new coal contracts, but he hasn't told them what he intends to do now that the government has taken over the mines. He might make a bargain with Uncle Sam or vice versa.*

• • •

New York

• • • **The coal controversy** was stalemated this week when the Government suddenly decided to take over the mines. Some sources had believed that the rail situation would be cleared up first, but it appears that the Administration felt that the threatened rail strike would not take place. The next step was to seize the mines and attempt production of coal, the lack of which is now endangering the entire reconversion program.

What success the Government will have in operating the mines was questionable at mid-week. While some miners will cooperate with the President, most of them will do whatever John L. Lewis says. At any rate it will take at least a week to 10 days before a heavy movement of coal reaches consumers.

While further meetings between the operators and the union may take place under government pressure, they will be just as futile as those which preceded. According to some sources, it is expected that with the Administration taking over the coal mines it will face the prospect of the miners refusing to go back to the pits in case the present truce is not extended.

With the Government moving in on the mines, veteran observers believe the pattern will be simple—the government will offer an 18½¢ an hr or slightly higher raise and compromise with John L. Lewis on the payroll assessment for a miners' welfare fund.

Steel companies which have been the unwilling spearhead with which John L. Lewis created the crisis in order to gain pressure for his demands will continue to struggle along at a steel rate far below normal until the mine workers' issues are settled. In some districts the two-week truce which ends this Saturday has meant little in the way of coal supplies from steel company-owned coal mines.

Roving pickets have closed down some mines, at other locations miners just refused to show up and at other pits absenteeism was so heavy on some days that a mere trickle of coal left the mines. Steel company coal mines have been particularly hard hit by wide variations in output at those mines which operated during the truce. The result has been that steel operating rates are expected to be highly erratic over the next few weeks with substantial variations among different steel companies.

•

Pittsburgh

• • • **On paper the** coal truce looked like a silver lining in the dark clouds to the steel industry, but in effect those dark clouds remained dark and the silver lining never showed through. Some coal came down river to the mills, but the amount was picayunish. Government priorities took coal from mines that normally produce for consumers classified with first priority under the government directive. Western Pennsylvania captive mines worked part time during the week, reaching a peak on May 15 with 20 of the 37 mines working, 10,369 of the normal 25,130 workers on the job, and producing 59,627 tons of coal against a normal of 132,500 tons. By May 18, however, the operations fell to eight mines working and 29 down, with production totaling only 17,000 tons.

Last Monday, only eight of the 37 captive mines were operating, six underground operations and two strip operations. As a matter of fact, strip operations are providing by far the bulk of the commercial coal produced, which now totals about 76,500 tons a day against a normal of 167,000 tons. Weirton's National mine and Youngstown Sheet & Tube Co.'s Buckeye London mine, both strip operations, were in production last week. The Warwick mine, serving public utilities, the Mather mine, termed a "half-captive" mine, J&L's Shannopin mine, Crucible Steel Co.'s Crucible mine, U. S. Steel's Palmer Dock operation, and Allegheny - Ludlum's Allegheny Coal & Coke Co. mine were the other captive operations working on Monday.

Major underground operations classed as commercial that were not in operation were: Pittsburgh Coal Co., 17 mines; Westmoreland Coal, five mines; Hillman Coal & Coke, 10; Westmoreland Mining Co., five; Jamison Coal Co., three of four; and Consolidation Coal Co., two mines.

The coal coming to U. S. Steel Corp.'s Pittsburgh operations did relieve to a minor extent a critical gas shortage on some finishing operations. The corporation's Clairton Coke works maintained its 15 pct operation. J&L dropped its

production rate this week, but part of this is the result of a strike of company-owned railroad employees on Saturday, May 18, which lasted an entire shift.

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Chicago

• • • **Most mills in** this district have received some coal shipments as a result of the truce. Wisconsin Steel works of International Harvester Co., whose workers are represented by the Progressive Mine Workers Union, and thus which has a good prospect of continued coal receipts whatever the result of the UMW truce, boosted its operating rate accordingly. The other mills having hot metal operations are more wary of the uncertainties involved and have increased operations little or only slightly. Only one blast furnace has been added in the district since the truce. Curtailments in electric furnace and finishing departments of the steel producers, and in nonferrous smelter operations which resulted from power use restrictions, all have been restored.

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Washington

• • • **Effective May 17,** captive bituminous coal mines, heretofore without ceiling prices, if ordered by the government to divert coal to regular commercial channels during the present coal emergency, may sell at once at the ceiling price of the nearest mine in the same or substantially similar seam, OPA has announced.

This action also makes provision that high-cost captive mines that cannot sell at these ceilings without financial loss if directed to sell in regular commercial channels may enter into agreements with their buyers to retroactively charge any higher ceiling that may be authorized by OPA for such high costs. Meanwhile, they should apply to OPA's national office for ceiling price adjustments.

Captive mines are included in the May 13 action which allows all sellers of bituminous coal to enter into agreements with their buyers to retroactively charge for the amount of any increase in ceiling price later granted by OPA to take care of increased costs resulting from present wage negotiations.

Eastern Pennsylvania Mills Get Carbon Steel Plate Price Increase

Philadelphia

• • • **Eastern Pennsylvania** steel mills have not yet reduced their openhearth operations significantly since most of these mills' openhearths are either oil or gas fired. However, should there fail to be a final conclusion of the coal strike at the end of the truce most mills here consider that their operations will have to be curtailed immediately as already the pig iron shortage is acute and threatens to grow worse.

Mills would be able to employ cast scrap to supplement their pig iron supply except that that grade of scrap is practically unobtainable in this area now with foundries employing devious methods to assure their own requirements insofar as possible. Therefore, some mills are using a larger proportion of steel scrap in their melts than normal and are adding graphite in order to bring up the carbon content.

Steel scrap itself is reported by a number of the mills here to be in short supply and this situation is attributed to the diversion of dealer activity to the more profitable salvage of marketable steel items in the current tight market for steel products. It is also assumed that the relatively small margin of profit on which yard men are now operating, with increasing labor and equipment costs, has served to limit their interest in scrap preparation and shipments.

Four eastern Pennsylvania mills have been granted price exceptions on carbon steel plates ranging from $2 per ton to $6 per ton. All these producers are applying the increases except one which has not yet determined how it will apply the increase to several of its products. It is understood that the unwillingness of this mill to apply the full increase is due to a competitive situation.

Other producers recognize that the price increases represented by the exceptions place their products at a disadvantage in competition with the larger producers but in view of the present market for steel products the differential is not considered significant at this time. The price exemptions on carbon steel plates granted by OPA to mills in this area are as follows: Alan Wood Steel Co., $5; Central Iron & Steel Co., $6; Lukens Steel Co., $5; Worth Steel Co., $2. Phoenix Iron Co. has made application to OPA for a price increase on certain products but this has not yet been granted.

Officials of most mills in this

TEMPORARY? *Here is the first train load of coal to reach Chicago after the two-week truce in the coal strike went into effect. Whether or not this represents a temporary easement in the nation's industrial plight will be settled soon.*

area are unwilling to believe that a railway strike could be permitted by the government to occur and they are therefore not particularly concerned with the effects of such a contingency. Should such a strike occur, officials are all agreed that the failure of incoming supplies and complete termination of deliveries would make it necessary to close down operations at once.

Canadian Steel Mills Take Sharp Cut Due To U.S. Coal Strike

Toronto

• • • **The truce** in the United States' soft coal strike is not expected to result in any speedy renewed flow of coal to Canadian steel companies. It is learned from official sources that both the Steel Co. of Canada, Hamilton and Algoma Steel Corp., Sault Ste. Marie, are nearing the end of their coal supplies and unless speedy relief is forthcoming there will be drastic curtailment in production schedules. Dominion Steel & Coal Co., Sydney, N. S., which obtains practically its entire coal supply within Nova Scotia will not be as seriously effected although its supply may tighten due to the fact that there has been emergency diversion of Nova Scotia coal supplies to the Province of Quebec.

Already Canada's primary iron and steel producers have been affected by the coal strike. Pig iron production at Algoma Steel Corp. and at Dominion Steel & Coal Co. has been cut back 25 pct by a government order to conserve coke for domestic heating needs next winter, but so far the order has not applied to the Steel Co. of Canada. However, if the coal situation becomes worse further production cuts will be necessary. Officials of the Steel Co. of Canada announced that recent coke output was 70 pct of normal with pig iron also substantially reduced. One of the company's blast furnaces recently relined and now ready to blow in, remains idle owing to the uncertainty of the coal situation. The company reports output of steel continuing near capacity but with a possibility of early curtailments for lack of fuel to fire openhearths and of pig iron and scrap to feed these furnaces.

WILL THEY OR WON'T THEY? *These western Pennsylvania soft coal miners refuse to obey John L. Lewis' order to return to the pits for a two-week truce. They have been drilled so long with the slogan "No contract, no work" that now that government has taken over the mines, a contract with Uncle Sam may be the only thing which will bring forth the coal.*

The first effect of the Federal Government's order to conserve coke has been a sharp reduction in supply of foundry pig iron for the Canadian market. The cut back in iron output also will limit steel production. The immediate affect of reduced steel supply has been a cut in schedules for rolling rails at Algoma Steel Corp. and Dominion Steel & Coal Co. as this item is considered the least important of the finished products due to the fact that Canadian railroads are well supplied and it will be the export demand that will be cut off.

OPA Raises Alloy Steel Increase to 8.2 Pct

Washington

• • • **OPA has decided** to boost alloy steel prices 4.2 pct, making a total increase in alloy prices of 8.2 pct since Mar. 1. Official announcement of the increase will be made shortly, since the necessary clearances have been obtained.

OPA says this increase will compensate for higher labor costs confronting alloy producers and that it averages the various increases given carbon steel products.

When the action is announced, OPA will also allow the 8.2 pct increase granted on Mar. 1 for all sizes of screen wire cloth (except 18 x 14 mesh) to apply also to all sizes of steel wire screen cloth, both black painted and galvanized.

There will also be a new schedule of extras for hot and cold-rolled carbon steel sheet and strip of selected rimmed stock steel so as to permit proper charges for deep drawing quality in these products. The new list of extras for drawing quality in uncoated or coated hot and cold-rolled carbon steel sheet and strip is as follows: 12 gage and heavier, 15¢ per 100 lb; 13 gage to 21 gage, 25¢ per 100 lb; and 22 gage and lighter, 35¢ per 100 lb.

In addition, OPA will permit resellers of iron and steel products on the Pacific Coast to include again in their maximum prices the amount by which all rail delivery costs exceed the cost of rail and water delivery. On May 10, OPA removed these charges for higher all rail rates from resellers' price schedules on the assumption that rail and water transportation had increased to a point where this special rate relief was not necessary. Investigation proved this assumption to be erroneous.

Steel Industry Wages Continue to Increase

New York

• • • **The average hourly** earnings of workers receiving hourly, piecework or tonnage wages in the steel industry established a record of 135.1¢ per hr in March of this year, according to the American Iron & Steel Institute. This record was made although steel production, (compared to that in March of a year ago) reflected some after-effect of the steel strike in January and February of this year.

With practically the same number of employees as in March 1945, the industry's total payroll in March 1946, was only about 10 pct less than it was in March of a year ago, when steel production was at a near maximum and total payroll reached its all-time monthly high. The payroll for March 1946, was $138,756,100, and for March 1945, was $154,976,700.

In March 1945, payments for overtime work were excessive because the industry was under high pressure to produce steel urgently needed for war purposes, and average overtime earnings amounted to about 12.5¢ per hr. In March 1946 overtime work had been reduced to a nearly normal peacetime amount, and was equivalent to average earnings of about 1.5¢ per hr. Net average earnings per hour in March 1945, were approximately 115.4¢, and in March 1946, they were 134.3¢, the difference reflecting the recent increase of 18.5¢ per hr.

Average employment during March of this year was 570,500 compared with 570,100 in March of 1 yr ago. Wage earners worked an average of 37.9 hr per week in March 1946, compared with 47.4 hr per week in 1945.

The production of steel ingots and steel for castings was 6,507,-047 tons, or about 15 pct less in March 1946 than in March 1945.

Army Ordnance Can Program Under Way

Washington

• • • **So that the Army** will have a supply of tanks, armored cars, mobile artillery units and other ordnance equipment ready to move at a minute's notice, Army engineers have authorized by contract the erection of 569 Army-owned standard bolted steel tanks. The tanks will be erected at ordnance plants and arsenals. (Ordnance development work in "canning" equipment was outlined in THE IRON AGE of Aug. 16, 1945. The Navy's inactivation program is described in the issue of Apr. 18, 1946.)

The estimated cost of erecting these tanks, which are of two sizes, will be $2,187,838. This will include humidifiers, which will be used to extract the humidity from the air inside the tanks. All that will be necessary to move the equipment promptly will be to remove the enclosing tanks and the vehicles will be in perfect condition, needing only the necessary fuel and lubrication to be ready for service.

The tanks are round and are of two sizes, 55 ft in diam by 11 ft high and 38 ft in diam by 11 ft high. After they are erected, they will be required to take the "soap bubble" test to make sure that they are airtight. The humidifiers will insure dry air in each tank.

They will be erected as follows:

Letterkenny Ordnance Depot, Chambersburg, Pa., 111 large tanks, 29 of the smaller size; Red River Arsenal, Texarkana, Tex., 64 large and 29 small; Mount Rainier Ordnance Depot, Tacoma, Wash., 18 large and 15 small; Sierra Ordnance Depot, Herlong, Calif., 27 large and 20 small; Tooele Ordnance Depot, Tooele, Utah, 79 large and 10 small; Lima Ord- and 27 small, and Anniston Ordnance Depot, Anniston, Ala., 38 nance Depot, Lima, Ohio, 86 large large and 16 small tanks.

Iron Ore Stocks Higher

Cleveland

• • • **Consumption of** Lake Superior district iron ore totaled 4,768,-718 gross tons in April, bringing the four-month 1946 total to 16,-257,163 tons, according to the current report of the Lake Superior Iron Ore Assn. The report showed 144 furnaces in blast, 108 U. S. and six Canadian, and a total of 81 idle out of 195. Stocks on hand May 1 at furnaces and Lake Erie docks aggregated 23,078,989 tons, compared with 16,428,765 tons on the same date a year ago.

Current inventories are not considered high in view of the high rate of consumption, according to competent observers, who on the basis of past experience feel that a six months' supply on hand May 1 is ample, but not unduly high, particularly in view of the peak operations the steel industry will attain following settlement of the coal strike.

FARMERS' DELIGHT: *Retired Army tractor does the heavier chores around the farm of Kamile Dupre. Former Army mechanic, hired to operate the vehicle, pulls a tree stump from the ground.*

Weekly Gallup Polls . . .

Veterans Express Dissatisfaction at UNO Progress

Princeton, N. J.

• • • **The weight of opinion** among veterans, the men who made the greatest contribution toward winning the war, is one of dissatisfaction with the way the United Nations is being conducted, according to George Gallup, director, American Institute of Public Opinion.

The poll giving these findings was completed just before the crisis over the Iranian situation had come to a new head.

What the dissatisfied veterans have to say about the UNO is reminiscent of the cynicism noted after World War I, when veterans said in effect, "We won the war! now the statesmen are losing the peace."

The same sentiment is found by field reporters when they asked World War II veterans dissatisfied with the UNO to tell why they were dissatisfied.

Typical comments by the general public as well as veterans:

"What have they done about Spain? Nothing. How about Iran? ...They're letting Russia shove them all over the place...Brother, there ain't no peace, the UNO is at war... The Big Three are at each other all the time...Where's the better world?"

The questions which more than 200 field reporters asked of World War II veterans, as well as the public at large:

"Are you satisfied or dissatisfied with the progress that the United Nations has made to date?"

The Veterans

	Pct
Satisfied	37
Dissatisfied	45
No opinion	18

On the whole, the general public is inclined to be a little less critical toward the UNO than veterans. Among those with opinions, the public is about equally divided on the question, one half expressing satisfaction with the United Nations progress to date.

Here is the vote of the public at large:

	Pct
Satisfied	37
Dissatisfied	37
No opinion	26

The principal reason why many veterans and the public at large show dissatisfaction at present with the progress of the UNO are are given by those interviewed in the poll, as follows:

(1) The UNO is not accomplishing anything. It is not making any progress at all.

(2) There is too much distrust in the UNO and too little attempt at cooperation.

(3) The whole thing is on a selfish plane, each country trying to get everything for itself. The whole thing is power politics and a system of appeasing such countries as Russia and Britain.

(4) The UNO has spent all of its time dealing with petty issues and has side-stepped every important issue which has faced it.

(5) The UNO has been far too slow in getting started.

(6) The UNO needs more power if it is to operate effectively.

The people who express satisfaction with the progress of the UNO to date admit for the most part that not much has been accomplished, but they counsel patience. "It takes time...They're trying hard...Doing everything possible under the circumstances."

Other interesting breakdowns of the vote on satisfaction and dissatisfaction with the UNO progress to date:

	Satisfied Pct	Dissatisfied Pct	No opinion Pct
Political			
Democrats	41	32	27
Republicans	36	43	21
Education			
College	39	51	10
High School	35	43	22
Grammar or no school	39	29	32

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• • • **A poll just completed** throughout the nation among World War II veterans indicates that the services might win a substantially larger proportion of volunteers than at present if their pay scale were upped by 50 pct.

Despite Postwar Cynicism Of Veterans, 23 Pct Would Return To Services if Pay Were Upped

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Congress has before it a number of proposals to increase the pay of men serving in the armed forces of the United States.

The increased pay is a feature which many observers regard as vital to the success of a program calling for a large voluntary army, as against a primarily draftee military force.

The reaction of the veterans to a proposal for higher wages for members of the military services is shown by replies to the question:

"Would you be interested in going back into some branch of the service if the pay were increased 50 Pct?"

	Pct
Yes	23
No	74
No opinion	3

A rough picture of what the figures mean may be gained from the fact that 23 pct of the number of former service men now in civilian clothes adds up to something like 2,300,000 men.

The replies to the question do not of course mean that former GI's who say they might be interested would necessarily return to the services if the rate of pay went up 50 pct, but it does indicate that the proposed boost in pay is, to their way of thinking, a step in the right direction.

The present rate of pay for a private in the United States Army is $50 per month, up to 3 yr of service. A 50 pct increase would boost this figure to $75 per month. Privates, first class, get $54 per month at present, up to 3 yr. The increase would give them a monthly income of $81. Corporals who now get $66 would get $99, etc.

The House of Representatives has already passed a bill provid-

(CONTINUED ON PAGE 152)

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INFORMAL CHAT: *Here are left to right, Sidney Hillman, head of the Amalgamated Clothing Workers, Sir Walter Citrine of England, head of the World Federation of Trade Unions and Philip Murray, CIO president, talking informally at the steelworkers' convention in Atlantic City, N. J., recently.*

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USWA Pledges No Interruption of Current Contracts

Atlantic City, N. J.

• • • **It was clear here** at the United Steelworkers of America convention, May 14-18, that the steel union does not intend to disrupt its contracts with steel firms during the life of the agreements, but it was equally certain that the prime demand next February will be for a guaranteed annual wage.

Details on the union's list of demands upon the steel industry for the next contract are expected to be worked out in the fall. Various rumors have been permeating throughout the industry that should the mine workers get a better deal than the USWA, the latter would go on strike or at least make new demands this year. This, Phillip Murray, CIO and USWA head, officially denied, as he reaffirmed an earlier statement after the steel strike that contracts would be scrupulously followed.

Striking out against criticism that the steelworkers union harbored Communists and was about to make a purge, Mr. Murray made one of the strongest statements of policy in his career as steel union leader. He indicated that the union was open for the membership regardless of national origin, color, religion or beliefs.

"We are run solely by our membership. This union will not tolerate efforts by outsiders — individuals, organizations or groups— whether they be Communist, Socialist or any other group, to infiltrate, dictate or meddle in our affairs. I do not direct that remark to any one person or group. I have in mind any attempt by any force outside our own membership to interfere in the functioning of our union.

By TOM CAMPBELL

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"At the same time, however, we will not permit any limitation on the free and democratic right of full discussion of trade union problems in our own ranks. We must not and do not seek interference with the free and democratic right of each member to practice such religion as he chooses, harbor such views as he chooses, in his private life as a citizen. Our union has not been and will not be an instrument of repression. It is a vehicle for economic and social progress," Mr. Murray stated.

The 2700 delegates representing one of the largest labor conventions in the history of the CIO were told by Lee Pressman to make themselves vocal in combating legislation tending towards restriction of union activities. Mr. Pressman analyzed both the Case Bill and the Ball Bill and insisted that all members wire their congressmen. The convention had all the earmarks of an industrial gathering signifying the distance the steel union has gone since it was first conceived in 1936.

That the steel union in particular would be again instrumental in attempting to unseat congressmen claimed to be unfriendly to labor or to elect those friendly was clearly indicated by the reception given Sidney Hillman, head of the CIO-Political Action Committee, when he unfolded plans for this year's fall elections. At the conclusion of Mr. Hillman's request for an all-out support of PAC, Mr. Murray asked that all delegates when they return home send their own dollar and see that their membership sent theirs to the Political Action fund.

Key men in the steelworkers organizing group and from other divisions of the CIO are expected to use the same general plan of attack in organizing workers in the South that was utilized during the past 10 yr in the North. Funds have been appropriated to carry on this drive and one of the steel union's strongest men, Van A Bittner, has been assigned the job of bringing in the membership. It is also expected that the USWA, recognizing the future trend of steel output on the West Coast will assign one of its Chicago men, Ken Hunter, to watch things out that way.

Some action is expected soon on a joint committee report covering the simplification of occupation classifications in the steel industry. The committee composed of U. S. Steel and USWA members has been working for some time on the problem of scaling down the unusually

large and unwieldy number of labor classifications which have grown like Topsy in the steel industry. It may be some time before this job is completed, but other steel companies are being immediately appraised of the committee's work and the conclusions reached.

The problem of alleged inequities among various wage rates is intimately tied up with the classification simplification job. The WLB some time ago set a ceiling of 5¢ an hr on any adjustment to be made. It is understood that the U. S. Steel Corp. has quietly offered to settle the inequalities on the basis of an average of 3⅜¢ an hr. A previous offer was said to involve an average of 2¼¢. When final agreement is reached the awards will be retroactive for a 2-yr period.

The USWA having been once defeated in the AFL stronghold at Geneva Steel works is expected to try its luck again at a new election said to be scheduled soon. At the present time the number of workers at Geneva is about 500, compared to a wartime peak of 5000. The USWA is expected to concentrate an organizing drive there when the successful bidder of the plant is announced.

A sidelight at the steelworkers convention was an exhibit by the U. S. Steel Corp. and the Aluminum Co. of America. Both of these firms used exhibits which had been previously shown at other industrial gatherings.

C. M. White Says Small Steel Orders Properly Belong to Warehouses

New York

• • • **Discussing the relationship** of the steel warehouse to the steel manufacturer, C. M. White, president, Republic Steel Corp., pointed out that small orders cost mass production operators money. He spoke before the American Steel Warehouse Assn, here, May 22.

"We recently made a study of our business and found that 35 pct of our customers contributed 95 pct of our tonnage. 5 pct, covering the very large customers, contributed 49 pct of our tonnage.

"We found also that we had been spending a great deal of time and money working with customers whose total annual purchases were very small," he said. "As a result of this study, we removed literally hundreds of accounts from our active files and stopped soliciting them directly for their business. These customers we believe logically belong to warehouses and not to steel companies.

"We appreciate, of course, that small buyers sometimes grow into big buyers, so we don't completely ignore them, but the bulk of our sales effort is going in the direction from which we secure the bulk of our business.

"The warehouse which most efficiently fulfills its function is the one prepared to give the best service to its customers. To do this, it must be organized and equipped to handle stock and ship its merchandise efficiently and promptly," Mr. White pointed out.

"Inventory control, records and careful product trend analysis are essential to anticipate these customers' requirements. You have the complex problem of buying, stocking and selling thousands of items, and unless a never ending study is kept of the requirements of your customers, it would, I should say, be very easy to find yourself in great difficulty," he said. "But with this type of advance information you also make life simpler for us because the need of special shipments diminishes accordingly.

"With greatly increased labor rates it has become necessary for both you and us to maintain a thorough-going control of operating costs. Unless that is done, we will both find ourselves in serious trouble.

"Just as we cannot be interested in small orders which disturb our production schedules, so you cannot be interested in carrying items which studies show do not move rapidly enough to pay a fair profit.

"The more accurately you know your costs, the better able you will be to control them and the better will be your chances of coming successfully through this period of high labor rates and fixed ceiling prices," Mr. White said.

Report Drop in Iron, Steel and Electrical Machinery Dividends

Washington

• • • **Iron and steel** and electrical machinery were the only groups reporting to the Office of Economics, Dept. of Commerce, which showed declines in dividend payments in the first quarter of 1946 as compared with the corresponding quarter of 1945. Iron and steel dividends declined to $45.9 million from $47.2 and electrical machinery showed a slight dip to $23 million from $23.3 million. In March of this year steel dividends dropped to $27.3 million from $29.6 million in the same month of last year while electrical machinery dividends fell to $3.6 million from $7 million.

Nonferrous metals paid dividends of $16 million in the first quarter of 1946 against $15.4 million in the corresponding period of last year and $7.2 in March 1946, compared with $9.1 in March of last year. Machinery, except electrical, paid dividends of $39.6 in the first quarter of the current year compared with $38.6 in the first quarter of last year and in March of this year paid dividends of $20.4 million compared with $23.8 million in March 1945. Transportation equipment dividends in the first quarter of 1946 were $11.1 million compared with $7.6 million in the first quarter of 1945 and in March 1946, they were $7.8 million compared with $5.8 million in March 1945. Automobile dividends of $48.6 in the first quarter of 1946 showed no change from the first quarter of 1945. In March 1946, they showed a slight decline to $43.1 from $43.5 in March of last year.

For the first quarter of 1946 publicly reported dividends rose to a total of $904.2 million, 7.7 pct above the $839.9 million total distributed during the first quarter of 1945. In March of this year publicly reported cash dividends paid by corporations amounted to $396.3 million, an increase of 2.1 pct over the $388.2 million paid in March 1945.

Largest increases in dividend payments for the first quarter of 1946 compared with the first quarter of last year were scored by the railroads, $49.4 million, up 23 pct, and trade, $63.1 million, up 21 pct.

Dept. of Justice Files Antitrust Suit Against International Nickel

Washington

• • • **Charging them with** monopolizing the nickel industry, a civil complaint was filed by the Dept. of Justice on May 16 in New York in the United States District Court for the Southern District of New York against the International Nickel Co. of Canada, a Canadian corporation, and its American subsidiary, the International Nickel Co., Inc. The two corporations with three of their officers were alleged to have violated Sections 1 and 2 of the Sherman Antitrust Law in connection with the importation, manufacture, distribution and sale of nickel ores, nickel and nickel products. It was also charged that the defendants "have preserved their monopoly position by cartel agreements with French and German competitors."

Attorney General Tom C. Clark said that the case is among the most important in the Department's program for eliminating restraints and monopolies in basic industries.

Wendell Berge, Assistant Attorney General in charge of the Antitrust Div., pointed out that "the suit seeks complete separation of the business of INCO, Ltd., and its American subsidiary, and asks that a plan be formulated by the court for redistributing the assets of these two companies in order to destroy their monopoly, to prevent a continuation of trade restraints which they have imposed, and to open the nickel industry in the United States to competition."

Coming Events

May 27-29 National Assn. of Purchasing Agents, Chicago.

May 29-31 Machinery Dealers National Assn., Atlantic City, N. J.

June 2-7 Society of Automotive Engineers, summer meeting, French Lick, Ind.

June 3-5 American Gear Manufacturers Assn., annual meeting, The Homestead, Hot Springs, Va.

June 13 Metal Powder Assn., spring meeting, New York.

June 17 American Society of Mechanical Engineers, machine design group, first session, Detroit.

June 17-18 American By-Product Coke Institute, first annual meeting, Seaview Country Club, Absecon, N. J.

June 17-20 American Electroplaters Society, annual convention, Pittsburgh.

June 24-28 American Society for Testing Materials, annual meeting, Buffalo.

Sept. 10-14 American Chemical Society, exposition, Chicago.

Sept. 11-12 Society of Automotive Engineers, national tractor meeting, Milwaukee.

Sept. 16-20 Instrument Society of America, first conference and exhibit, Pittsburgh.

Oct. 1-4 Iron & Steel Exposition, Cleveland Public Auditorium, Cleveland.

Oct. 3-5 National Electronic Conference, Chicago.

Oct. 3-5 Society of Automotive Engineers, aeronautic meeting and display, Los Angeles.

Oct. 28-30 American Gear Manufacturers Assn., semi-annual meeting, Chicago.

Nov. 7-8 National Founders Assn., annual meeting, New York.

Nov. 18-22 National Metal Congress and Exposition, annual meeting, Atlantic City, N. J.

International Nickel Claims Competition

Copper Cliff, Ont.

• • • **R. L. Beattie,** vice-president of the International Nickel Co. of Canada, Ltd., issued the following statement in connection with antitrust proceedings announced by the United States Dept. of Justice.

"The complaint seems to be that because the nickel we mine in the Dominion is purchased by a large percentage of United States nickel users, our company is to be classed as a monopoly illegal under United States law.

"Our nickel is in active competition with the production of other producers, including that of the United States government from Cuban deposits, and also it is in competition with many other alloying elements. The prices we have charged in the United States have been so low as to require the United States government to give during the war substantial subsidies to our competitors. Our nickel all comes from a small area in Ontario, next door to the United States market; but there are vast nickel deposits owned by others in many parts of the world.

"The company has no agreement with any of its competitors which prevents their competing with it in the sale of nickel in the United States market or elsewhere. The company's position in the industry is the result of engineering and metallurgical leadership and of unceasing research over more than half a century to create new alloys of nickel and to expand uses.

"Our plant property in the United States consists almost entirely of our rolling mill at Huntington, W. Va., and represents barely 4 pct of the company's total plant property."

Hardware Price Clarified

Washington

• • • **Stamped luggage** hardware is entitled to a price increase of only 10 pct under specific subdivision 10, Amendment 12, MPR 591, Order 48 issued Mar. 13, 1946. It is therefore not affected as THE IRON AGE had been originally advised by a subsequent stamping increase of 19 pct provided in Amendment 32, RMPR 136 issued Apr. 8, according to OPA's Metal Pricing Div.

The London ECONOMIST

A Solution for Trieste

TRIESTE is living through weeks of political delirium. While its fate is discussed in Paris, Slovenes and Italians alike are trying to prove their case by staging feverish parades and demonstrations. The few villages scattered along the foothills of the Julian Alps all the way from Carinthia to Trieste are covered with posters and slogans which proclaim the Slovene character of the countryside. In the rural areas of Venezia Giulia, the desire of the population to join Yugoslavia is genuine and overwhelming.

Tito's prestige here seems to be unchallenged, probably much more so than in Yugoslavia itself. To the Slovene peasants of Venezia Giulia he is not simply the leader of a faction. To them he is the national hero who has come to redeem the Western outpost of the South Slavs from Italian oppression. The memory of that oppression is strong and bitter. Under Mussolini the Slovenes were forbidden to use their own language and were subjected to forcible Italianization. In the years of war, their partisans fought Italians and Germans with great tenacity; and most of the villages here are now exhibiting their rolls-of-honor, which show the numbers of partisans and villagers who perished in Italian or German concentration camps.

The Slovenes took it for granted that after the end of the war they would settle their account with the Italians for good. To them, settling their accounts means the incorporation of the whole of Venezia Giulia, including Trieste, in Yugoslavia itself. Last year when Field-Marshal Alexander's troops moved into Trieste, they found a partisan administration already established there. The Field-Marshal's demand for their withdrawal and the subsequent dispute over Trieste came as a rude shock to the Slovenes. They have seen in these events almost a betrayal of an ally in favor of an enemy.

Since then, Tito's "National Bolshevik" propaganda has kept this feeling alive. Every now and then huge, well-organized, and well-disciplined processions of Slovenes descend with their blue, white and red colors and Red Stars from the Julian Hills into the boulevards and squares of Trieste to proclaim their "sacred right" to the city. There a committee representing the former partisan administration, scrapped by order of the British and American Military Government, continues in being as a sort of pretender to power. This committee is conducting a campaign for the "redemption" of Trieste, and trying to persuade everybody who cares to listen that "Trieste will die without the Yugoslav hinterland."

"Trieste will die, if it ceases to belong to Italy" is the answer of the local Italian committee of liberation which represents a rather shadowy Italian resistance movement, allegedly born after Mussolini's downfall. Both sides produce volumes of propagandist treatises and statistics. But the statistics of both sides are so clumsily manipulated, and their historical arguments so crudely manufactured that they need not be reproduced here.

THE fact is that Trieste itself feels as strongly Italian as the surrounding countryside feels Slovene. Moreover, Trieste has the mentality of Italy's outlying bastion. It lives with memories of its opposition to the Hapsburgs and of its final liberation from Austrian rule—which official Italian historians somewhat pompously style "the great closing chapter of the Risorgimento." Until quite recently, Trieste also clung to the idea that it had a "mission" to Italianize the surrounding Slavs, lest Trieste itself should cease to be Italian. Until recently, too, the city served as the most important springboard for Italian economic and political penetration into the countries of the Danube Basin. Nothing could appear more disgusting and degrading to most Triestines than the idea that from an outpost of the Italian Empire their city should become an outpost of the Balkan Slavs.

Reprinted by special permission to further understanding on how political and economic affairs are viewed in London.

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Meanwhile the Slovenes who cry treason because Trieste has so far been denied to them seem to forget that, as far as reasonable ethnical claims go, they have nearly won the day. Not only have they regained Fiume, once a free city with Yugoslav consent under the Treaty of Rapallo in 1920, and then seized by D'Annunzio and incorporated in Italy. In addition, most of Venezia Giulia is now under Yugoslav occupation. The so-called Morgan Line has divided the province into Zone A, held by the British and Americans, and Zone B, held by the Yugoslavs. The Morgan Line runs to the west of the Wilson Line of 1919 and, for the time being, leaves the industrial areas of Istria and Southern Istria (with their deposits of coal, mercury and bauxite) in Yugoslav hands.

The frontier proposed by the Western Powers in Paris is in part even more favorable to the Yugoslavs. In the north of Venezia Giulia it almost coincides with the line proposed by the Russians, and turns eastward only near Trieste. In Southern Istria the frontier proposed by the Americans would leave on the Italian side the coal mines of Arsa, which used to supply nearly a third of Italy's very limited domestic coal output. The British line would give these coal mines to Yugoslavia, but return the great naval base of Pola to Italy. The French line would give Pola as well as Arsa to Yugoslavs, and, as it may well prove acceptable to the other Western Powers, the Yugoslavs have probably won the whole of Venezia Giulia. Thus only Trieste and its immediate surroundings are now debatable territory.

(CONTINUED ON PAGE 152)

Japan's Yawata Steel Plant Survives the War

By ALLAN F. MATTHEWS,
Arlington, Va.

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• • • **Japan's greatest** steel plant, the Yawata works on the northern coast of Kyushu, reached a peak ingot output of 2,123,000 metric tons in 1943 and is now operating at only 10 to 20 pct of capacity, due to shortages of coal, ore, and carbon electrodes.

The plant suffered only minor damage from the single bombing raid to which it was subjected. On June 16, 1944, from airfields in China, some 80 to 100 Superfortresses dropped incendiaries that hit a tinplate rolling mill, a sulfuric acid unit, and some of the facilities for manufacturing inflammable byproducts such as benzol and creosote. About a year later the residential sections of the city of Yawata were struck by a second air raid and were wiped out.

Capacity at Yawata was virtually unchanged during the war, yet the production peak was reached in 1943. It was not until that date that Japan was able to capitalize fully on the resources of its stolen empire, and after that time it began to feel the effects of Allied jabs at its vital transportation lanes. The extent of the steel pinch by 1945 is exemplified at Sasebo (Japan's second largest naval base, 80 miles southwest of Yawata), where the nearly-completed 30,000-ton carrier *Hayataka* was never finished, despite its high priority, allegedly because of lack of steel. A sitting duck, it was eventually heavily damaged by B-29s.

The Yawata Steel Works, first modern mill in Japan, was built by the government in 1901 as the Seitetsu Jo (Imperial Steel Works) having a capacity of about 90,000 tons annually. The capacity was doubled by 1909, as a result of the Russo-Japanese war, and was gradually enlarged to 1,000,000 tons by 1927 (See THE IRON AGE, Jan. 5, 1928, p. 55).

A merger in January 1934 of the Yawata steel plant with several Mitsui, Mitsubishi, and other private mills became known as the Nippon Seitetsu (Japan Iron & Steel Works), the Imperial Government retaining most of the capital stock. Steel production of the combine exceeded 4,000,000 metric tons in 1943. The affiliated plants are at Hirohata, Hyogo prefecture; Kamaishi, Iwate prefecture; Osaka, Osaka prefecture; and Kawasaki (Fuji works), Kanagawa prefecture—all in Honshu—and at Muroran (Wanishi works) in Hokkaido and Kenjiho and Seishin in Korea.

The Yawata works (including neighboring Tobata) by the date of Pearl Harbor comprised 12 blast furnaces totaling 6000 metric tons daily, 38 open hearths (37 basic and 1 acid) of 300 tons each, and 12 electric furnaces totaling 106 tons daily, as shown in table I. It would seem, then, that steel production reached only 50 pct of openhearth capacity, probably due to the limitation of rolling mill facilities. The only expansion during World War II was the addition of one electric furnace and a carbon black plant, the latter to meet the needs of the rubber industry. All bessemer converters had been dismantled. Among the materials particularly difficult to procure under wartime conditions were ferromanganese, ferrosilicon, and fluorspar.

There are numerous coal mines south of Yawata, and the steel works gets about a third of its supply some 30 miles away from its own Futase mine, which normally produces more than a million tons annually. Coal output is currently suffering drastically from a shortage of miners, who, despite a preferred status in the food rationing system, find they eat more regularly if they visit their country relatives.

Iron ore was shipped in during the war from Korea, Manchuria, northern China, Hainan Island (southern China), and Malaya, but now Yamata must depend entirely on Kamaishi magnetite and Wanishi bog iron ore, supplemented by small shipments from Shimane and Kusatsu in northern Honshu. No iron-bearing sands have been consumed at Yawata.

Limestone is obtained from Gotoji and Tsukumi (Oita prefecture) and Sone, Kyushu, and a little from Honshu. All firebrick used are made from clay dug along the Tsukinokawa River near Nagasaki, 100 miles to the southwest. Silica, chrome, and magnesite brick are also burned in Yawata yards.

The three openhearths currently operating each receive a daily charge of 50 tons of pig iron and 250 tons of ordnance scrap, the latter consigned by the U. S. Marines disposition officer. The product is a medium carbon steel for nails, concrete-reinforcing wire, structural girders, bars, and tinplate. The electric furnaces take a charge of nearly 100 pct

TABLE I

Furnaces At Yawata Steel Works, Japan, in 1946
(In metric tons)

	CAPACITY			OPERATING FEBRUARY 19		
	Units	Tons Daily	Total	Units	Tons Daily	Total
BLAST FURNACES	2	1,000	2,000	1	1,000	1,000
	1	700	700	1	700	700
	1	500	500	..	.....	.....
	3	400	1,200	..	.....	.....
	2	350	700	1	350	350
	3	300	900	1	300	300
	12	.....	6,000	4	.....	2,350
OPEN HEARTHS	38	300	11,400	3	300	900
ELECTRIC FURNACES	1	18	18	..	.....	.....
	4	15	60	1	15	15
	2	10	20	2	10	20
	3	6	18	3	6	18
	1	3	3	..	.....	.....
	2	1	2	..	.....	.....
	13	.....	121	6	.....	53

ordnance scrap plus a little silicomanganese (50 pct Mn, 20 pct Si) from Yazaki, near Kagoshima, southern Kyushu. This yields a high-carbon steel for rails and wheel axles. The electric furnaces also make carbon for arc electrodes to cut up scrap.

A rolling mill is turning out sheet 3 x 6 ft x 0.7 mm to provide corrugated galvanized construction material for erecting temporary shacks in bomb-devastated areas. A wiredrawing mill is making 100 tons a day of wire 9 mm in diam for fire pokers, etc.

Sulfuric acid is burned from iron pyrites mined at Yanahara, Okayama prefecture, Honshu. The lead chamber process is utilized, and the requisite nitric acid is provided by the oxidization of ammonia with a platinum catalyst. Facilities include two lead chambers (one 50-ton daily and one 40-ton) and four towers; an additional 40-ton chamber was destroyed by bombing. The product has a strength of 50°Be, but 4 tons daily are concentrated by the cascade process to 66°Be. Iron sinter residue is sent to the blast furnaces.

Yawata produces 3 tons daily of ammonia sulfate, formerly used for explosives and now for fertilizer. Other coke-oven byproducts are led to 21 tanks of 50-ton capacity as crude, from which are distilled 65 tons monthly of benzol, napthalene, and toluol.

Management of the Yawata works remains in the hands of the same executives who directed it into the Japanese war of aggression. Takashi Miki, formerly vice-president, has recently become president.

There were 30,000 workers in the plant during the war and 4700 in its offices, whereas now there are 17,000 and 2000, respectively. Most of them work from 7 a.m. to 5 p.m., or 9 hr plus 1 hr off for lunch. Other shifts are 6 a.m. to 3 p.m., and 2 p.m. to 11 p.m. and 10 p.m. to 7 a.m. All but a standby force are off on Sunday. Wages averaged 235 yen monthly but were raised in February to 400 yen ($26.66 at current exchange) to compensate for inflated living costs.

The only American forces stationed at the Yawata plant are a few of the 6th Marines, 2nd Division, specifically a lieutenant and three shifts of three men each, who see that the ordance scrap is actually charged and who keep a rough check on output.

UNTOUCHED: *The general view of the Yawata plant taken by the author in February* 1946. *Only minor damage was suffered by this steel works from a single bombing raid on June* 16, 1944.

A few miles east of Yawata is the unbombed Kokura arsenal, where thousands of machine tools in excellent condition stand idle, awaiting the possibility of shipment to China. Accessory warehouses are bulging with steel, copper, zinc, tin, etc. in sheet, bar, and rod, indicating that although the Japanese suffered a shortage of many materials, they were surely not lacking everything, even at the end of the fight. At Kokura the Marines destroyed thousands of dollars worth of laboratory scales, spectroscopes, high-frequency radios, optical instruments, pyrometers, etc. which might better have been shipped to Yawata as long as it has been decided to permit the plant to operate. On the whole, however, the difficult job of occupation appears to be managed quite creditably.

DEMOLISHED: *This once was a torpedo ordnance plant at Nagasaki,* 100 *miles to the southwest of the Yawata plant, its source of steel. This plant was about two miles from where the atomic bomb exploded.*

OPA Sets Ceilings On Two Types of Barbed Wire Declared Surplus

Washington

• • • **OPA has announced** that maximum prices have been established on two types of barbed wire declared surplus by the armed forces and offered for sale in regular civilian channels.

One is two-strand galvanized steel, type A, 12 or 12½ gage wire of four point barbs, 4 in. apart.

The other is single-strand concertina barbed wire of 14 gage with barbs spaced 2⅜ in. apart. This wire, somewhat deteriorated because of the weather, will be sold "as is" but can be put into prime condition by annealing, pickling, galvanizing and rewinding.

Effective May 21, the retail ceilings are $1.65, $4.85 and $5.65 for the 28 lb, the 80 rod and 100 lb spool, respectively, of the first type barbed wire.

For the single-strand concertina wire, the retail ceilings are $1.33 for a 55 lb coil, and $15.50 for 100 lb coil after it has been annealed, pickled, galvanized and rewound.

On all sales to wholesalers by a government agency, the ceilings for the double-strand wire are 95¢ for the 28 lb spool; $2.80 for the 80 rod spool, and $3.25 for the 100 lb spool. For all sales by brokers the ceilings are $1.05, $3.08 and $3.58, respectively. And on all sales to retailers and exporters (provided the material is warehoused) the ceilings are $1.25, $3.66 and $4.25, respectively.

On sales to wholesalers, the single-strand concertina wire has a ceiling of 75¢ for a 55 lb coil; 83¢ for sales to brokers and $1 for all sales to retailers and exporters.

After this wire has been anneale, pickled, galvanized and rewound, the ceilings are $9.73 per 100 lb for all sales by brokers, and $11.68 for all sales to retailers and brokers.

Ordnance Dept. Swings Into Postwar Research

Washington

• • • **In celebrating its 134th** birthday on May 14, the Ordnance Dept. was able to announce a contract termination job 93.4 pct complete. Ordnance procured $38 billion worth of material during the war, which made it the largest of the Army's procurement services.

Out of more than 15,000 contracts valued at $8209 million, unterminated on VJ-Day, Ordnance has completely settled 14,076 with a value of $5092 million. A successful effort was made to settle contracts with small business men first to accomplish speedy reconversion.

Swinging into its 135th year, Ordnance is already actively involved in postwar activities. New contracts have been given to 600 firms to improve standard ordnance items and to develop new weapons. Twenty-five colleges and universities are busily engaged in research and development work for the department.

During the war Ordnance furnished the Army and 40 Allied nations with well over 43 billion rounds of rifle and machine gun ammunition; over 1 billion artillery projectiles; more than 17 million rifles and pistols; nearly 3 million machine guns; approximately 600,000 artillery weapons; and 3.5 million vehicles including 100,000 tanks. The Department trained over 500,000 Ordnance troops for combat as well as technical work, and is now training postwar personnel in depots, arsenals and leading technical institutions throughout the country.

Will Roll Continuous Strip at Fort Wayne

Cleveland

• • • **Cleveland Graphite Bronze Co.,** which recently purchased a factory building at Fort Wayne, Ind., plans to install a strip mill for rolling continuous coated steel strip from which the bearings are made, according to Ben F. Hopkins, president.

Cleveland Graphite Bronze will take possession of the property, which consists of a factory with 42,500 ft of space and 2,768 acres of land with a siding on the Nickel Plate RR, as soon as possible.

In addition to the strip mill, present plans call for the installation of specialized machinery to manufacture automotive-type bearings and bushings, Mr. Hopkins said.

He said the company also expects to use the Fort Wayne facilities for warehousing stocks of bearings, and that production at the plant will represent an expansion of the company's output, as the main plant here and the branch plant at Bridgeport, Ohio, will continue to operate at full capacity.

The Fort Wayne plant was built in 1942 by the National Can Co., as a war plant, but is now occupied by the Magnavox Co. Price was not made public.

Fushman Returns to RFC

Washington

• • • **Arthur J. Fushman,** WAA Deputy Administrator for Operations, has tendered his resignation to return to RFC.

Expressing regret over the resignation of Mr. Fushman, Lt. Gen. E. B. Gregory, WAA Administrator, said that Frank Creedon will direct disposal of consumer and producer goods and will thus shoulder a large part of the responsibility previously held by Mr. Fushman. Mr. Creedon and John J. O'Brien and James A. Mollison, heading real estate and aircraft disposal respectively, have been appointed deputy administrators and will report direct to the Administrator.

ASM Ships Food to France

Cleveland

• • • **Five thousand pounds** of food is being shipped each month to French metallurgical engineers by members of the American Society for Metals, according to figures released by ASM national headquarters here.

E. E. Thum, editor of the ASM journal, "Metal Progress," and progenitor of the idea, said that during April, approximately 500 packages, averaging 10 lb each were shipped by society members in all parts of the United States to overseas destinations.

Recipients of the packages, Mr. Thum said, include metallurgists, metallurgical laboratory technicians, professors in technical schools, and metallurgical production personnel. The list is not confined to ASM members.

Swiss Aluminum Plants Shut Down Because Of Alumina Shortages

London

• • • **The Swiss aluminum** producers, Aluminum-Industrie-A.G. (Chippis), revealed in their annual statement as reported in *Metal Bulletin* that owing to insufficient imports of alumina most of their plants were idle during 1945, work at the Chippis reduction plant ceasing at the end of January. After alumina imports from France were resumed in the spring, the Chippis works restarted to a limited extent in May, but the total output for the year was less than one fifth of capacity.

In order to increase stocks the firm took steps to obtain alumina from Canada, but owing to high ocean freights and other expenses the cost was excessive. Throughout 1945 the price of French alumina was about three times the prewar level, and it was not until the end of the year when the French franc was devalued that the price was reduced, though insufficiently.

As the Chippis aluminum output was not sufficient to meet Swiss needs, metal was imported from Canada. In the autumn all official decrees regarding aluminum consumption were withdrawn and trading was made free. There was also much foreign interest in aluminum and aluminum semis. At the same time the effect of the cheap overseas quotation was evident, and at the beginning of December the company reduced the selling price of virgin metal from 2.80 to 2.20 Swiss francs per kilo, making the price only 10 pct higher than prewar.

The electrolytic plant of the Aluminiumwerke Neuhausen A.G., a subsidiary company, had to stop work in February of last year through lack of alumina. The firm's bauxite mines in Rumania and Yugoslavia are idle, and in Hungary mining operations are proceeding on a reduced scale. Of the alumina works, the Martinswerke near Cologne and the plants at Porto Marghera (near Venice) were damaged during the war and, although they are still out of operation, part of their capacity is now ready for working. The output of the Marseilles alumina works suffered severely from coal shortage and general conditions, and the undamaged aluminum reduction plants of Lend in Austria and at Rheola in South Wales are not working. The Rheinfelden works suffered no damage and is maintaining minimum operations by using its own electric power.

Strikes Halt Return Of Overseas War Dead

Washington

• • • **As a result** of the coal and steel strikes, return of American war dead from overseas will be delayed at least six months, it was said here as President Truman signed the bill authorizing the War Dept. to begin repatriation. Original plans had called for the first remains to be returned in July.

Iron and steel accounts for nearly 200 lb of the total casket weight of about 225 lb. For the repatriation work, military specifications call for an all-metal casket with body and lid made of deep-drawing quality cold-rolled sheet steel together with bolts, nuts, studs, tap rivets and screws.

Packard Suffers Loss

Detroit

• • • **The final assembly** line of Packard Motor Car Co. was able to operate only nine days during the first three months of 1946, due to parts shortages caused by strikes in supplier's plants, according to George T. Christopher, president and general manager. As a result, a net loss before tax credit totaling $3,465,449 was sustained during the three months ended Mar. 31. Estimated net income tax carry-backs refund of $3,218,000 reduced the net loss to $247,449. This loss may be compared with a profit of $655,420 for the corresponding period of war production last year.

Factory sales for the first quarter included fewer than 1500 Clippers. Sales volume aggregated only $5,737,225, compared with $97,977,931 for the first three months of 1945.

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OLD FOR NEW: *Salvaged from a New York demolition job, this material will probably find its way into some consumer's hands rather than be used as scrap because of of the present tight steel situation.*

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Announces Publication Of New Handbook On International Trade

New York

• • • **The Committee for Economic** Development May 20 announced publication of a new handbook dealing with international trade in the postwar period. Wayne C. Taylor, former president of the Export-Import Bank of Washington, and present chairman of CED's international trade committee, said the handbook is designed to assist manufacturers, wholesalers, jobbers and retailers whose plans for postwar expansion of their enterprises include export and import trade operations.

Prepared by CED's International Foreign Trade Committee, the handbook represents the combined experience of experts in international trade from these cooperating organizations: Assn. of Consulting Management Engineers, Inc., Bankers Assn. for Foreign Trade, Business Publishers International Corp., U. S. Chamber of Commerce, Foreign Credit Interchange Bureau, National Assn. of Manufacturers, National Council of American Importers, Inc., National Foreign Trade Council, Inc., U. S. Dept. of Commerce, and U. S. Associates, International Chamber of Commerce, Inc.

"Through this cooperation, it has been possible to include for the first time in one handbook, detailed information based on the experience of all these organizations. The handbook sets forth practical steps to which a businessman—whether already engaged in international trade or just planning to enter the international market for the first time—should give consideration," Mr. Taylor said.

He pointed out that the postwar period is one not only of unusual opportunities for international trade but that it also is one presenting many new problems. He said:

"The next few years will offer favorable opportunities for getting into exporting, one end of international trade. It is going to be relatively easy for the United States to sell certain goods or commodities abroad because only the United States has them or the elaborately industrialized economy for making them. In other goods or commodities, the United States will enjoy for some time the advantage of an industrial strength that is scarcely impaired and in many ways vastly increased.

AAF Terminates Contract

Detroit

• • • **Eight months** after VJ-Day the Army Air Forces largest single war contract has been terminated, according to an announcement by officials of Army Air Forces and the Ford Motor Co. The value of the contract which required construction of the giant Willow Run plant and airport for the production of 8685 four-engine bombers has been placed by the government at $2,600,000,000.

Termination of the contract was complicated by the fact that more than 10,000 purchase orders and 1500 direct subcontractors were involved. This is in addition to an indeterminate number of subcontractors to the direct subcontractors.

Production of B-24 Liberator bombers was started at Willow Run in 1942. At peak production, the plant was turning out a bomber an hour. Peak employment was 40,000 persons.

Hunger Strike of Ruhr

(CONTINUED FROM PAGE 84)

Germans, and further strikes can be expected.

One of the basic inequalities is that the seemingly equable cut of 25 pct to all importers assumes that all European countries depend in the same measure upon imports. Thus we find that there is a wide variation in effect upon the total coal supply wrought by such a cut, depending upon domestic production.

Such a consideration, of course, only scratches the surface. If we are to proceed beyond the initial stage into a consideration of the effect on the coal supply, would it not be right to consider also the availability of other fuels outside of coal. And then there are the evaluations of the amount of war damage, restitutions, collaboration, and a dozen other factors which might be used in deciding how much coal any particular country deserves.

Then there is the possible consideration of the relative merits of the products that may be produced. What is needed most, the reconstruction of the Ruhr, so coal output can be increased and transport equipment built elsewhere, or the direct promotion of food output so that the ration cuts can be restored as soon as possible?

Or would it seem more advisable to put the German industry at the end of the rehabilitation list, and to allow Belgium, Luxemburg, and France to furnish the steel that would come from expanding output in the Ruhr?

The only possible obvious answer to the above question would be to ascertain, product by product, if the steel items needed in western Europe can indeed be made by other mills outside the Ruhr. But the British authorities, for reasons best known only to officialdom, refuse to discuss either what steel products are being made in Germany, or what they hope to make, further than to say that, "Well, there is a shortage of wire rope in the Ruhr coal mines."

The occupation authorities in Berlin are not entirely to blame for even their section of the program, the determination of how much coal can be exported from Germany in any given period.

Four armies, staffed with government economic experts of varying degrees of qualifications are gathered for a primary task of making Germany an operating entity. Their bosses are preoccupied with German problems, with German needs with doing a good job of governing Germany. In the face of such circumstances, it would seem a natural development, although undesirable that they should remain ignorant of the details of the needs of the rest of Europe, and reluctant to magnify their own problems in occupation by exporting more coal than they can avoid.

It is certain that in all such international allocation work there is a great deal of upstage expansiveness and behind the scenes maneuvering to get the best possible deal. The coal situation has not been without its log-rolling, and is likely to see much more before next winter. At the moment it appears that the smaller nations are left holding the Atlantic Charter and the coal bag (empty).

International Accord Needed to Eliminate Chaos in Trade-Marks

Washington

• • • **Commissioner of Patents** Casper W. Ooms said last week that the registration of trade-marks is in a chaotic state in this country as well as throughout the world. He added that there is an acute need for a world-wide, up-to-date index in all trade-marks in use. He pointed out that the Patent Office file is cluttered up with trade-marks that have expired and that many trade-mark users do not bother to register their marks. The Commissioner said that the problem of trade-mark registration is further complicated by the diversity of laws governing trade-marks in the 48 states and the conflicting decisions in the various state, federal and Patent Office tribunals.

Mr. Ooms said there is not much that the Patent Office can do at present to clear up the situation because of lack of funds and space to set up an adequate system. But he explained, the Patent Office is trying to help persons seeking to establish trade-marks as much as it can by adopting a "positive" rather than a "negative" attitude. In addition, it was stated, the Patent Office is considering publication of the most reliable and recent information available regarding trade-mark law and practice as a guide to present and prospective trade-mark owners.

Because an increasing number of American commodities are sold in world markets, the trade-mark problem is really an international one, Mr. Ooms said. He declared that it is the aim of the Patent Office to encourage the formulation of international agreements to help clear up the present world-wide chaos in trade-mark usage.

The present law requiring that a trade-mark be actually put into use before it can be registered works a hardship on businessmen, according to Mr. Ooms. Some system, he said, should be devised to afford interim protection during the initial period when a businessman has decided upon the mark he plans to use but must wait upon the manufacture of packages and printed material before he can put the trade-mark into use.

Soviet Five Year Plan Sets National Goal Of Raising Output 48 Pct

New York

• • • **The Soviet Union's** new Five Year Plan for production and restoration of that nation's economy defines the tempo and level of production for 1946-50. Gross output of the entire industry of USSR in 1950 has been fixed at 205,000 million rubles (at 1926-27 prices) or 48 pct above the prewar level. However, in districts occupied during the war, the prewar level is expected to be exceeded by 15 pct.

In the iron and steel industry, it is planned to increase pig iron output to 19.5 million tons and steel production to 25.4 million tons. This would set production sights at 35 pct above prewar level. To achieve this 45 more blast furnaces, 180 new openhearths, 90 electric furnaces and 104 rolling mills will be put in operation.

As for nonferrous metals, the plan purports to achieve self-sufficiency. Compared with prewar levels, copper output will be increased 1.6 times; aluminum, 2.0 times; magnesium 2.7 times; nickel, 1.9 times, lead 2.6 times, zinc 2.5 times, tungsten concentrates 4.4 times, moly concentrates 2.1 times, and tin 2.7 times.

In the fuel industry, in 1950 output of coal will be increased up to 250 million tons or by 51 pct above the prewar level. Mechanical equipment of the coal industry will be increased three or four times the prewar period. Oil production will gain 14 pct above prewar and electric power output is set at 70 pct above prewar.

While steel output will be at the rate of 25.4 million tons annually, the plan provides for increasing the number of machine tools to 1,300,000 or approximately 30 pct above the number of machine tools in the United States in 1940.

Along with extensive mechanization and electrification of production, the plan outlines several lines of research and development including gasification and electro-chemical utilization of solid fuel; production of synthetic fuel, rubber, leather and alcohol; introduction of oxygen in various industrial processes, mainly in the iron and steel and chemical industries, and the applications of atomic energy to industry and transportation.

Redesigns Kaiser Engine

Detroit

• • • **The 6-cylinder** engine which will power the 1947 Kaiser automobile has been redesigned to turn up 92 hp at 4000 rpm, according to an announcement by H. C. McCaslin, vice-president in charge of engineering at the Kaiser-Frazer Corp.

Increasing the engine's capacity from 85 to 92 hp was accomplished, according to Kaiser Frazer and Continental Motors engineers, by high speed timing adjustments, changes in the cams and by making the valves larger in proportion to cylinder diameter.

The new engine is compact and light weight and was especially designed for the front-wheel drive Kaiser.

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LIVESTOCK LIMOUSINE: *This deluxe model trailer, built by Fruehauf Trailer Co., Detroit, offers a passenger car ride for livestock. Being completely covered, the unit can be used to haul almost every kind of commodity on return trips.*

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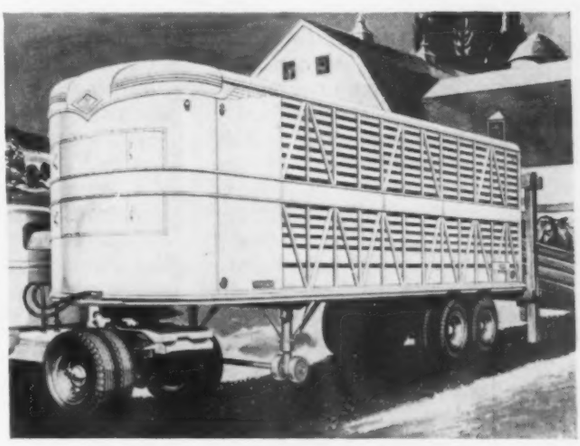

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JACK H. JONES: *Labor member of Parliament for Bolton at entrance to the House.*

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British Steel Nationalization Certain of Labor Support

London

• • • **A decision to** nationalize the British steel industry brings forth a host of questions about the men who are in the House of Commons, who will vote for the plan when it is presented. Are they genuinely socialists? What do they want from the steel industry? What will it mean in Pittsburgh and Gary?

Despite the superficial window dressing of the eventual nationalization bill it is certain to be supported by all Labor Party rank-and-file members of the House like John H. Jones. The House knows this first-term member as a "back-bencher" so named from the seat he occupies.

Jack Jones, as he is more commonly known is a steel furnace man, a trade union leader, and sometime lecturer on Lawrence of Arabia, the Labor Party, industry in America, or the Russian zone of Germany. A veteran of the 1914-1918 war himself, he is father of six children, five of whom have taken part in the recent conflict.

His start in the steel industry was inherited from his father, who was superintendent of the Park Gate steel works in Rotherham, just outside Sheffield. Having such an "in" with the management he was able to start immediately at the high station of laborer in the brick crew, at the age of 16. Pay, 9¢ an hr. Except for minor interruptions brought about by a couple of world wars he spent the next 33 yr close enough to a steel furnace that he will always be a melter, though he may also be a practicing politician.

The trade union tradition was also inherited from his father, who was held in such high esteem by his fellow workmen that he remained always a member of the union although he had long since become a part of management. The relationships have become more formalized since those days, and the present Mr. Jones states that he has on more than one occasion been forced to choose between promotion from his first helper's job and the abandonment of his union activities. He has always, to date, chosen to remain with the union.

The lecturing career started after Mr. Jones had returned from a campaign in World War I as a member of Lawrence of Arabia's Imperial Camel Corps. His experiences included some of the most colorful exploits in the Middle East, he mastered the Arabic language, and took an interest in Lawrence's ideas for improving the plight of lower class Arabians.

A 13-week tour of American industrial plants during the recent war as a representative British workman revived his speaking activities. He averaged more than two speeches a day during the entire visit.

The newest item in his lecturing repertoire, the Russian zone of Germany, is the outgrowth of a tour made early this year. His reporting of his travels is methodical, he frequently stays up until the wee small hours night after night recording his observations for future lectures.

The acceptance in 1919 of his first union job, that of shop representative in the British Iron & Steel Trades Confederation local in his plant was easily the turning point in his career. The next year he became president of the local, and was the same year elected to the city government local council.

He ran for the local government job on the Labor Party, and then as now housing was one of his prime worries. Municipal housing construction accomplished in those days in his home town included 1500 homes for workers, but there is still urgent need today for additional houses. Public health, recreation and education particularly in vocational lines were other matters which interested him during his municipal government days.

During all the years from 1920 until his election to Parliament last year he participated in wage and hour negotiations with the management of his firm, as well as serving on many union committees. Upon his return from America in 1945 he was appointed by the then Minister of Labor, Mr. Ernest Bevin (today's foreign minister) to be chairman of the Essential Works Order Tribunal for the North of England. This ministry court was for appeals under the compulsory working regulations of the war. Men ac-

cused of absenteeism or job jumping were brought before it for trial. Mr. Jones held the job for about 10 months, hearing 88 sessions and handling about 10 cases per session. This was his first paying job outside his work at the steel furnace.

He is convinced that Britain's long-range steel future is in an export market in world-wide competition. Despite strong convictions of the worth of old British steel makers and furnaces, he does not consider English rolling mill and finishing practice to be up to American standards. Unwilling to tip the hand of cabinet prematurely he was noncommittal before the nationalization announcement, but states definitely today that he believes the industry should be nationalized or at least brought within government control.

Monopolies, cartels and tariffs have, in his opinion, been in a large measure responsible for what he describes as the present noncompetitive position of the British industry. The members of the present Parliament use the terms "labor party" and "socialist" interchangeably, and Mr. Jones sees accordingly in the concept of public ownership the answer to the evils of monopolistic control.

In his personal opinion the system of public ownership will work if it is possible to get the individuals with management experience to cooperate in the project. He expresses confidence that it will be possible to get this assistance.

There were two important conclusions which he drew from his American tour which have become a part of his personal ideology. The sight of wartime activity in new American mills convinced him beyond all doubt that the rolling of English mills is technologically far behind that of America, and that broad modernizing programs must be undertaken in England as soon as possible.

The second conclusion is that no proposal of public ownership for American steel mills would ever be seriously entertained by unionists in America. He says simply, "They are doing well enough as they are."

His view of the large capacity and specialization of American mills has firmed his conviction that in the long range view, America could if it so desired dominate the world steel export market. His socialistic convictions of the ultimate worth of nationalizing the British industry to benefit the working class of Britain begins to be tinged at this point with a slightly conflicting view of sheer economic self-preservation for British industry. He wants to benefit the working classes by nationalizing and thus modernizing the British industry. Also he wants to nationalize and modernize for the somewhat capitalistic purpose of preserving British trade superiority.

The furnaces at the Lancashire Steel Co. Ltd. works near Manchester where Jack Jones was senior first-hand melter from 1932 to 1945 is a modern 100 ton venturi type openhearth, making all types of high quality tube and sectional steel. He is a staunch supporter of the old craft traditions of British industry, and believes that he could take a crew of average English furnace men into any steelmaking shop in America and increase its output. He doubts that even a picked crew of Americans could do so in Britain. In his opinion the rated 90 million ton steel industry of America would actually be in the region of a 100 million ton industry if it were operated by British furnace crews under the existing good American conditions.

He does not hesitate, however, to give America full credit for having moved far ahead in the development of rolling mill practice, and delivers his views with the same enthusiasm that he uses in praising British furnace practice.

While he expresses doubt that any system of public ownership might affect the American steel industry, he is convinced that in the CIO Political Action Committee today there is the beginning of a true Labor Party in America. He traveled to most of the steel production centers in the eastern states, and many of his conversations with union leaders were on the subject of political action.

His views on the subject of such political action by the labor union are conditioned, of course, by long training in the British Labor Party. He became a member of it when he was 15 yr old, and his union has been considering public ownership of the steel industry ever since 1923, and advocating it as policy since 1930. The cornerstone of the Labor Party policy today is in his understanding a "middle-of-the-road" policy, a concept that in America is doubtless difficult to fully appreciate. In Britain, where a few channel miles serve to separate democrats from the advancement of Communism across Europe, the term is more understandable. The Labor Party is definitely against communism. Mr. Jones describes the hopes of the party as a desire to raise productivity, and to attain a higher standard of life, not only in Britain, but throughout the world.

He considers his personal experiences with management to have been excellent. Although in the years of negotiations of which he is a veteran there have been many differences, he thinks highly of the managers of his firm. The firm has never had a strike, lockout or work stoppage of any kind since he took control of the local or branch in 1920. He attributes much of this record to a mutual recognition of the worth of collective bargaining. The successful operation through those years of a system of tying wages to the current market price of steel would seem to testify to the mutual trust of management and labor.

Appointment of management representatives on the basis of family connection, tradition and birthright is the main complaint that he expresses out of his personal experience in the steel industry. He acknowledges that this practice is waning, but in his opinion it is still far too prevalent, and is in a large measure responsible for the present condition of the British industry.

Since being elected to Parliament last summer he has departed from the firm, but his relations with the management remain good. They carry to him their fuel troubles, and the other problems that any harassed firm might in America decide to call to the attention of their Congressman.

His experiences from the social angle have also been on the fortunate side, in comparison with the bitter taste he might carry if he had lived between the wars in South Wales. Irlam knew no serious unemployment problem be-

Industrial Briefs . . .

• SURPLUS TOOLS — Entitled "Re-tooling America," a booklet telling what types of machine tools are surplus, where they are, how much they cost, and how to get them has been prepared by War Assets Administration. It will be ready for distribution sometime in May.

• BUILDS WAREHOUSE — Joseph T. Ryerson & Son, Inc., has begun the construction of a new large warehouse and office building at 53rd and Lakeside Ave., Cleveland. Construction will consist of structural steel framework, concrete and brick.

• BUILDS PLANT—The Lindsay Corp., Chicago, is building a new one-story plant and two-story office in Melrose Park, Ill. Construction, which began in February, is now nearing completion and the company expects to begin production of Lindsay Structure in the new plant by the middle of July.

• TO BUY AIR PRODUCTS—Norge Div. of Borg-Warner Corp. has completed negotiations for the purchase of the Air Products, Inc., Chattanooga, Tenn., plant and transfer of title from the War Assets Administration.

• BUYS SKF STEELS—Peterson Steels, Inc., New York, has purchased the merchandise inventory, machinery, furniture and fixtures, etc., from SKF Steels, Inc., which has now ceased doing business. Nelson S. Peterson is the president of the new company, Bertil R. Gustring, secretary, and Frank W. Bussell, treasurer.

• CANADIAN SUBSIDIARY — Ekco Products Co., Chicago, kitchenwares manufacturer, has formed a wholly owned subsidiary, Ekco Products Co. (Canada), Ltd., to handle merchandising and sales. A manufacturing agreement for Canada has been concluded with Robert Mitchell Co., Ltd.

• APPROVES MERGER — Barium Steel Corp. stockholders, at the annual meeting, approved completion of the merger with the Central Iron & Steel Co., steel plate producers at Harrisburg, Pa. Barium Steel acquired majority control of the Central Iron & Steel in March, and the Central Iron & Steel stockholders voted approval of the merger at the meeting on Apr. 29.

• AUSTRALIAN CONTRACT — The Meehanite Metal Corp., New Rochelle, N. Y., has advised that through their Australian offices a contract has been negotiated with the Mars Machine Tool Mfg. Co. Pty. Ltd., of Bridge St., Valley, Brisbane, Queensland, Australia. This company will undertake the manufacture of Meehanite castings to be used in the production of their machine tools.

• ACQUISITION—It has been announced that Milton Levenson has acquired the Miles Metal Corp., 92 Liberty St., New York. Mr. Levenson will take over the active management of this metal brokerage company, and will trade in all grades of ferrous and nonferrous metals for domestic consumption and for export.

• RHEEM EXPANDS—Rheem Mfg. Co. has embarked on a $5 million plant expansion program, which will involve manufacture of new products, including water softeners, a farm electric water heater, a stoker furnace, and others.

• COMPRESSED AIR MILL — Quincy Compressor Co., Quincy, Ill., has produced a 25 min 16 mm sound color film dealing with fundamentals and properties of compressed air, its use, and working principles of different types of compressors. The film is available on a free loan basis.

tween the wars, at least comparatively. His works saw bad times, but were never completely shut down. Mr. Jones himself was among those who always had some form of work. He foresees no serious unemployment problem for the town in the near future, but shares the international misgivings as to the future of industry in face of a possible world-wide slump, possibly caused by conditions in America.

His visit to American industry also provided a convenient absence during which the union council nominated him to the parliamentary panel for the 1945 election. Within two weeks after he had returned from the trip he had been selected to stand for election for the city of Bolton. It is a cotton textile center, about ten miles from Mr. Jones' home in Irlam. A town of about 120,000, Bolton is what is called a double constituency; that is, there are two members for the whole city, and is also the largest constituency in Britain.

Labor candidates had won the city only once in the history of the party, while the conservative plurality in the previous election had been 14,000. He ran against a lawyer who was a co-director of a firm, and an army officer who is chairman of a bank, to change 27,000 votes for a plurality of 13,000.

Jubilee to Open May 29

Detroit

• • • **The Detroit** Automotive Golden Jubilee celebration will open May 29 regardless of the conditions resulting from any resumption of the coal strike, a national transportation tieup, or any similar development according to an announcement by Civic Chairman Prentiss M. Brown and Industry Chairman Lt. Gen. William S. Knudsen of the Golden Jubilee committee. A statement issued by the committee points out that Detroit and the automotive industry — including all groups in Detroit — are joining hands in this mammoth 12-day celebration to develop the individual and collective momentum and unity of purpose needed to produce the goods which are so necessary throughout the world.

Construction Steel...

New York

• • • **Fabricated steel awards** this week included the following:

2700 Tons, Reading, Pa., bridge for Reading Co., to Bethlehem Steel Co.

1900 Tons, Gary, Ind., alterations to merchant mill warehouse, Carnegie Illinois Steel Corp., to American Bridge Co., Pittsburgh.

1800 Tons, New York, tunnel section and plaza, through E. W. Foley Associates Co., Inc., to American Bridge Co., Pittsburgh.

1675 Tons, Iowa, three bridge superstructures, to American Bridge Co.

1300 Tons, Ann Arbor, Mich., general service building, University of Michigan, to American Bridge Co., Pittsburgh.

1300 Tons, Hammond, Ind., engineering office building, Standard Oil Co. of Indiana, to American Bridge Co., Pittsburgh.

1200 Tons, Princeton, N. J., university library building, to American Bridge Co.

1100 Tons, Clark, N. J., paper mill and power plant, U. S. Gypsum Co., to American Bridge Co., Pittsburgh.

1000 Tons, La Grange, Ill., Electro-Motive Div., engineering and experimental building, to Joseph T. Ryerson & Son, Inc., Chicago.

900 Tons, Cleveland, nurses home, through Gilmore-Carmichael-Olsen Co., to American Bridge Co., Pittsburgh.

700 Tons, Chicago, service hangar, through Austin Co., to American Bridge Co., Pittsburgh.

425 Tons, Akron, Ohio, warehouse, Akron Coffee & Grocery Co., to American Bridge Co., Pittsburgh.

363 Tons, Peoria, Ill., addition to heat treatment building, Caterpillar Tractor Co., to Mississippi Valley Structural Steel Co., Decatur, Ill.

300 Tons, Webster City, Iowa, bridge W-354-8, Illinois Central System, to American Bridge Co., Pittsburgh.

275 Tons, Newark, N. J., bottle pasteur building, through James Mitchell, Inc., to American Bridge Co., Pittsburgh.

230 Tons, Norristown, Pa., Sacred Heart Hospital, to Phoenix Bridge Co.

190 Tons, Long Island City, N. Y., warehouse, through Peerless Construction Co., to American Bridge Co., Pittsburgh.

175 Tons, Carteret, N. J., dock building, Peters Iron Works, to American Bridge Co., Pittsburgh.

133 Tons, Los Angeles, Calif., addition to Oxford building for Southern California Telephone Co., to Bethlehem Pacific Coast Steel Corp.

130 Tons, Plainville, Conn., Pequabuck River bridge, through Brunalli Construction Co., to American Bridge Co., Pittsburgh.

125 Tons, Fleetwood, Pa., storage building for A. R. Warner & Sons, to Bethlehem Steel Co.

100 Tons, Leesport, Pa., storage building for A. R. Warner & Sons, to Bethlehem Steel Co.

• • • **Fabricated steel inquiries** this week included the following:

3250 Tons, Oakland, Calif., Eastshore Freeway overcrossing at 5th Ave., California Div. of Highways, Sacramento, bids to open June 12.

2500 Tons, Passaic River and Route 25A, vertical lift span, postponed to June 4.

2450 Tons, Fort Peck, Mont., risers and surge tanks, bids to U. S. Engineers, due June 3.

465 Tons, Philadelphia, Inquirer rotogravure building, through McCloskey Co., bids in.

450 Tons, Philadelphia, bottling plant for Coca Cola, bids in.

335 Tons, Philadelphia, Frank B. Warren warehouse building, through Charles Lennig.

320 Tons, Kelseyville, Calif., bridge and approaches across Kelsey Creek, California Div. of Highways, Sacramento, bids to open June 12 (readvertisement).

280 Tons, Odair, Wash., steel warehouse, Grand Coulee Dam, Bureau of Reclamation, Denver, Specification 1341, bids to open June 7.

150 Tons, Danville, Pa., machine shop for Kennedy—Van Saun.

150 Tons, Montville, Conn., addition to generating station of Connecticut Light & Power Co.

138 Tons, Redlands, Calif., bridge and approaches across Mill Creek, California Div. of Highways, Los Angeles, bids to open June 13.

100 Tons, St. Clair, Pa., repairs to Reading Co. coal dock, bids in May 18.

• • • **Reinforcing bar awards** this week included the following:

125 Tons, Valparaiso, Ind., Valparaiso University, dormitories, to Ceco Steel Products Corp., Chicago.

• • • **Reinforcing bar inquiries** this week included the following:

1375 Tons, Oakland, Calif., Eastshore Freeway overcrossing at 5th Ave., California Div. of Highways, Sacramento, bids to open June 12.

805 Tons, Friant, Calif., Central Valley project, bids to U. S. Bureau of Reclamation.

750 Tons, Brooklyn and Queens, N. Y., connecting highway construction.

600 Tons, Kankakee, Ill., Borden Co., elevators.

484 Tons, Weber County, Utah, two bridges, Sta. 113/35.8 and Sta. 121/14.27, State Road Commission, Salt Lake City.

400 Tons, Cotter, Ark., Bull Shoals Dam.

322 Tons, San Diego, two overcrossings, Route 77 and Mission Valley Road, California Div. of Highways, Los Angeles, bids to open June 13.

300 Tons, Ann Arbor, Mich., Engineering Building, University of Michigan.

290 Tons, Delaware County, Pa., highway work and bridges.

250 Tons, Youngstown, Ohio, spring common bridge, bids soon.

212 Tons, Los Angeles, undercrossing on Santa Ana Parkway at 1st St., California Div. of Highways, Los Angeles, bids to open June 13.

179 Tons, Sells, Ariz., grading on Tucson-Ajo highway, State Highway Commission, Phoenix, bids to open May 24.

151 Tons, Spadra, Calif., two ward buildings, Pacific Colony, State Div. of Architecture, Sacramento, bids to open June 5.

150 Tons, Tucumcari, N. M., Bureau of Reclamation project.

132 Tons, San Diego, Balboa Parkway overcrossing at University Ave., California Div. Highways, Los Angeles, bids to open June 13.

125 Tons, Fort Wayne, Ind., Lutheran nurses home.

100 Tons, Milwaukee, telephone building.

100 Tons, Fort Dodge, Iowa, Borden Co., elevators.

• • • **Sheet piling awards** this week included the following:

450 Tons, Dubuque, Iowa, guide wall for U. S. Engineer, to Bethlehem Steel Co., through La Crosse Dredging Co., Chicago, contractor.

WAA Leases Adrian Aluminum Extrusion Plant to Bohn Co.

Washington

• • • **The buildings and** approximately half the equipment of the aluminum extrusion plant operated during the war by Bohn Aluminum & Brass Corp., at Adrian, Mich., have been leased to the firm for 10 yr with option to purchase. Bohn will continue the same type of production, according to the WAA announcement.

Disposal of a 167-mile pipeline, an emergency feeder to the Big Inch, has also been announced by WAA. It was acquired by Southwestern Independent Gas Pipe Line Co., an affiliate of the Houston Industrial Gas System which said it needed the additional facilities in order to meet future requirements of expanding industrial facilities in the Houston area.

Other WAA recent plant disposals include the following:

By sale, the Strom Steel Ball Co.'s plant at Cicero, Ill., to Sola Electric Co. of Chicago, for manufacture of television and other special application electrical equipment.

By sale, United Aircraft Corp.'s (Pratt & Whitney Div.) Hartford plane engine plant, to Silent Glow Oil Burner Corp., Hartford, Conn., for expansion of oil burner production.

By sale, the Sal-Way Steel Treating Co.'s Detroit steel plant, to Sal-Way, for operational expansion of heat treatment of cutting tools and small steel parts.

By sale, National Cylinder Gas Co.'s plant at Euclid, Ohio, to the firm for production of acetylene gas.

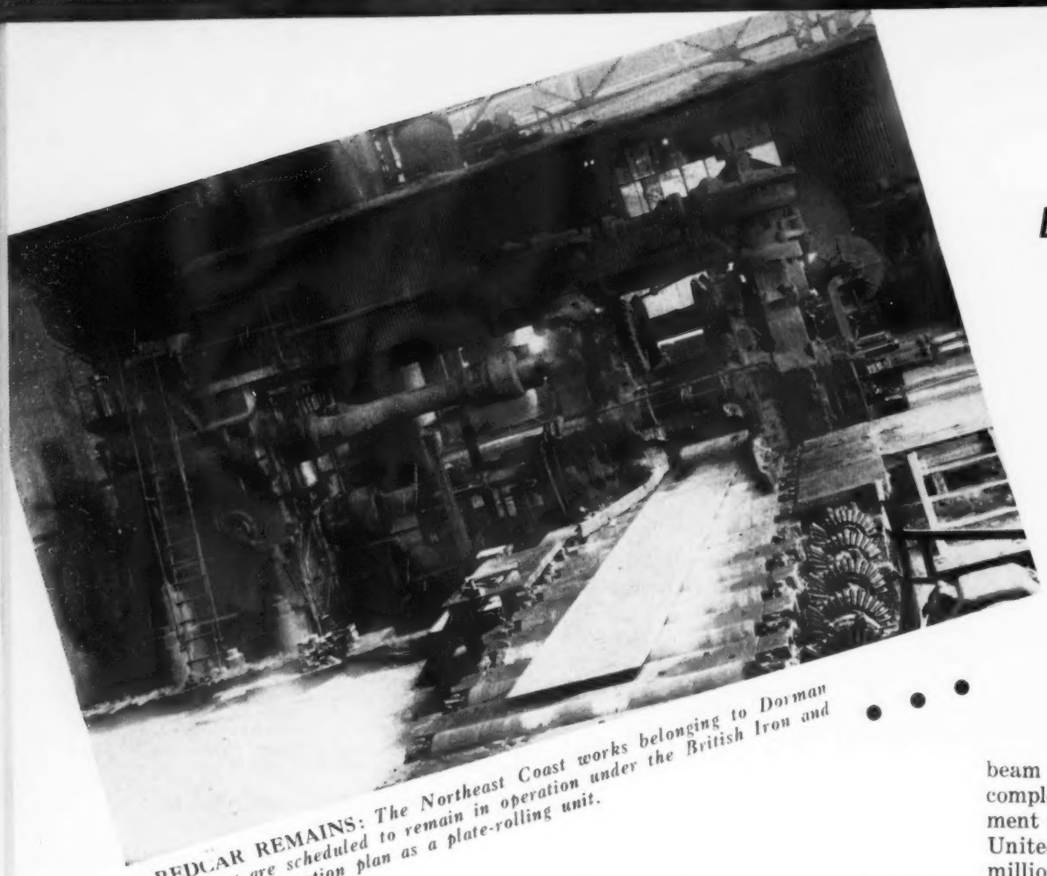
By sale, Continental Ordnance Co.'s incomplete heavy steel casting plant in East Chicago, to General American Transportation Corp. for manufacture of motor buses.

Suspends Steel Strapping

Washington

• • • **Effective May 22,** price control has been suspended from steel strapping, steel gas cylinders, copper engravers sheet and plate, nonferrous lockseam tubing, metal washers and industrial steel wool.

In announcing the suspension action, OPA said that production in these items is either so ample or demand so small that little or no price increase is expected. In any event, cost of living or business costs would be affected but little.



REDCAR REMAINS: *The Northeast Coast works belonging to Dorman Long are scheduled to remain in operation under the British Iron and Steel Federation plan as a plate-rolling unit.*

British Federation

London

• • • **Five new continuous** billet mills plus new steel plants at the Summers Shotten continuous strip mills and at Colvilles Dalzell works in Scotland are the headline features of the British Iron & Steel Federation report to the government. The status of the proposals outlined in the plan is now somewhat indefinite, as they were outlined by the industry to be constructed under private control.

Now that the government proposes to take over the industry in a system of public ownership, it has not been definitely established that the plan will be followed in every detail. However, as the government specifically approved the proposals in the plan when it announced its intention of nationalizing, it seems likely that the industry plan will be used as the detailed outline for development in the next few years.

Following heated parliamentary demands recently the report has been published in white paper form, along with the report of the Council of British Ironfounders for the future of their industries.

A few of the major proposals in the plan had already been printed (See The Iron Age, May 2, 1946, p. 99) and the plans or construction of a new continuous strip mill in South Wales and a beam mill in the North had already been announced.

The overall modernization plan involves replacement and expansion of the steel industry in 7½ yr of about 40 pct of the capacity of the industry at a total cost of $672 millions.

The five new billet mills are to be supplied by new modern blast furnaces and steel plants, including a mill on a new site in Northamptonshire; new blast furnaces, steel plant and a rebuilding of the Lincolnshire section mills; a new blast furnace and steel plant and mills to provide a start for future developments in Scotland, and other small projects.

The report of the federation urges highest priority for the new sheet and tinplate plant, because of the degree of cost reduction achieved and the importance of the product to export.

The report states that it takes into full consideration all factors, including making full use of home resources, with production on Midland domestic ore sites going up by 60 pct.

Lumping together the rolling mill program 100,000 long tons of rolling mill machinery will be needed. With British rolling mill building capacity at about 15,000 tons per yr, part of which is needed for repair and export, it will be necessary to import about 30,000 tons if the plan is to be completed on schedule. According to the federation if no imports are available the new strip mill and the beam mill will take 2 yr longer to complete. The cost of the equipment outlined for import from the United States is about $24 to $28 million.

The plan involves the building of 24 blast furnaces with a total capacity of 4,750,000 long tons and the scrapping of 53 furnaces with a capacity of 3,000,000 long tons. This construction should raise the average basic pig iron output for the United Kingdom per furnace from 90,000 long tons in 1939 to an estimated 160,000 in 1950.

The rolling mill plants to be built include five billet mills with an average output of approximately 450,000 long tons, a heavy structural mill of 350,000 long tons, a strip mill of 1,000,000 tons, and three cold reduction strip mills of about 250,000 tons each. Also proposed are two plate mills, one of 350,000 long tons for heavy plates and one for light and medium plates of 150,000 tons.

The plan has been drawn up after a study of the potential demand for both domestic and export. Noting the long term expansion which has been characteristic of British domestic production, the report predicts an estimated long period domestic demand of 14.5 million net tons per year, and a 3.3 million net ton export business.

Copy of the steel report follows: **MODERNIZATION AND DEVELOPMENT PROPOSALS:** Particulars of the major plan for modernization and development

Makes Known Its Modernization Plan in White Paper . . .

By JACK R. HIGHT

are given in this section. The total expenditure involved is shown in table I.

TABLE I
Summary of District Expenditure

South Wales	$164,000,000
North East Coast	140,000,000
Scotland	116,000,000
North West Coast	5,200,000
Sheffield	22,000,000
Lancashire, Flintshire, Staffordshire, etc	68,000,000
Lincolnshire	76,800,000
Northamptonshire	80,000,000
Total	$672,000,000

SOUTH WALES: The predominant factor in the steel industry in South Wales is the manufacture of tinplate and sheets. Out of a total ingot production in 1939 of 3,203,200 tons, over 2,352,000 tons were required for flat-rolled products. The proposals for this area are based essentially on the modernization of this section of the industry.

The main feature of the program is an increased capacity for hot-rolled strip for sheets and tinplate by continuous rolling of about 1,120,000 tons. The existing capacity of the Richard Thomas and Baldwins plant at Ebbw Vale is 672,000 tons; the proposed capacity at Ebbw Vale and at a new coastal works to be built by Guest Keen Baldwins at Margam, Port Talbot, South Wales, will be 1,848,000 tons of hot-rolled strip a year.

The following tonnages will then be produced in South Wales by continuous strip mill methods: approximately 728,000 tons of tinplate, or 15 million boxes, which is 75 pct of the estimated tinplate production of the country; 840,000 tons of sheets, including fully finished sheets up to 72 in. wide for the automotive industry; and 112,000 tons of light, medium and heavy plates up to 72 in. wide by 0.75 in. thick. The heavier plates hitherto rolled in this area will be transferred to other areas to secure more economic loads.

Experience has demonstrated that a large proportion of the ingot tonnage for the strip mills must be of higher quality and in larger ingots than have been made for the normal handmill production, and that new openhearth furnace capacity must be created. These steel furnaces will need to be supplied with pig iron of a quality demanding the use of a large proportion of foreign ore in the burden to secure the desired low phosphorus content. For reasons of economy this pig iron manufacture should be on the seaboard with the facilities for handling suitably sized vessels, and the unloading, stocking, crushing, grading and sintering of ore.

Capacity must be provided for the cold reduction of this hot strip in modern mills, and additional continuous cold reduction mills will be installed to supplement the existing mills at Ebbw Vale and at Lysaghts, Newport, in Wales. Existing units are being improved. The total expenditure involved in the South Wales strip mill developments is approximately $39,200,000.

Amplification of the proposals for this district are given in the following sections.

Hot Rolled Strip, Steel Plant and Blast Furnaces: To secure the advantages of a seaboard location with existing pig iron and ingot capacity, the proposal is to erect on an available site adjacent to the Guest Keen Baldwins works at Margam a new 80-in. continuous hot strip mill with a capacity of 1,120,000 tons, suitable for processing into plates, sheets and tinplate.

This mill will be preceded by a new slabbing mill capable of handling 1.40 million tons of ingots, and by a new openhearth shop with an initial capacity of 896,000 tons of ingots. The existing Margam openhearth furnaces are to be improved to furnish 224,000 tons of ingots, giving a total of

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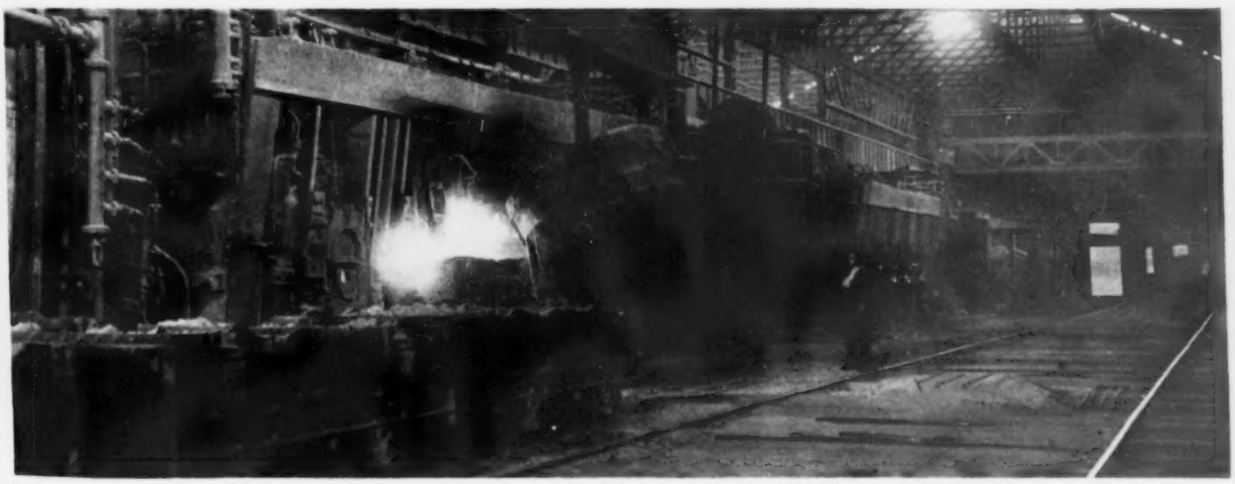
SKINNINGROVE DOOMED: *The British Iron and Steel Federation report refers to the Skinningrove iron works as follows: "While the plant is fulfilling important functions in the existing economy, no permanent future is foreseen for this works."*



1,120,000 tons of hot ingots direct from the steel furnaces to the mill.

The new melting shop will be laid out to enable extensions to be made to provide all the steel required as hot ingots, but in this first stage it is proposed to draw up to 280,000 tons of cold ingots from the existing steel works in West Wales.

To provide the 840,000 tons of pig iron required for this enterprise and the adjoining Port Talbot steel works, the existing blast furnaces at Margam, one of which is already under reconstruction, are to be enlarged, the ore dock is to be extended, and facilities installed for the preparation of the iron ore to secure the maximum economy in coke consumption. These developments will give an additional pig iron capacity of 336,000 tons.

An additional coke oven battery is to be erected to meet the increased demand for coke, and to provide a total supply of 672,000 tons, representing an increase of 313,600 tons.

In parallel with the new installations at Margam it is proposed to increase the hot strip capacity at Ebbw Vale by additions to the hot continuous mill to enable it to raise its production from 672,000 to 784,000 tons. Owing to the limitations of the site, it is not considered practicable to make at Ebbw Vale the total requirements of steel. It is proposed to install one further openhearth furnace to increase production by 56,000 tons and to continue the present procedure of drawing the remaining steel supplies as ingots from the Richard Thomas and Baldwins West Wales works and as slabs from their works at Redbourne. Lincolnshire. It is also proposed to increase the pig iron capacity at Ebbw Vale by about 112,000 tons.

These proposals provide for the 1,848,000 tons of hot-rolled strip required. In this first stage 1.68 million tons of ingots will be produced in the two works completely integrated to the hot strip stage, leaving 560,000 ingot tons to be fed to the mills in the cold state from existing steel works.

Production of Tinplate: The demand for tinplate in the near future is estimated to be in the neighborhood of 22,400,000 boxes per yr, and it is proposed in the initial stage to make provision for the manufacture by modern methods of 75 pct of this total, or 15 million boxes, leaving five million boxes to be made by certain of the existing plants operating on the old standard methods which are suitable for certain special lines and for lower-duty plate.

An important aspect of the modernization plans is the location of this new plant for the cold reduction of the hot-rolled strip and the finishing operation of tinning. There can be no doubt on technical grounds and on the basis of economy that the lowest capital expenditure and operating costs would be attained by the integration of these finishing operations with the production of the hot-rolled strip in composite works.

It is thought that it might be considered undesirable to concentrate so large a part of the steel and tinplate industry in the two areas of Ebbw Vale and Port Talbot, with its resulting movement of population and loss of industry in many villages and towns. While the operations up to the production of hot strip are not economically divisible further than has been embodied in the proposals made above, it is practicable to make a division after the hot strip stage and for the cold-finishing operations to be divided into several units of economic capacity.

It is therefore proposed that the cold reduction operations shall be carried out in the existing mill at Ebbw Vale, which is capable of being improved to a capacity of five million boxes, and in two of the latest type continuous cold reduction mills to be built by a new company amalgamating a number of tinplate firms, one mill to be installed in the Llanelly district and one in the Swansea area of Wales. These two new mills will be duplicates and each capable of producing seven million boxes of tinplate. The three mills together would be capable of producing practically the whole of the tinplate requirements if conditions so demand.

In the first instance, it is proposed to operate the two new mills on the basis of an average of five million boxes per mill, giving, with the Ebbw Vale mill, a total of 15 million boxes of cold-reduced plate.

The surplus capacity of these mills will be utilized for the cold reduction of sheets.

Tinning: Rapid advances and changes in the methods of tinning and protection of plate for various purposes have been made in recent years, and research and experimental work in this field is being actively pursued at present. It is, therefore, considered inadvisable to make a final commitment at this stage on the new plant and the methods to be ultimately employed.

While the extent to which electrolytic tinning can be applied economically, or the best type of electrolytic plant, cannot be determined, it is decided to proceed with the completion of the unit in course of installation at Ebbw Vale for the electrolytic tinning of 1.5 to 2 million boxes.

It is further considered that for certain types of plate the electrolytic method will not be suitable and that hot-dip plate must be produced. It is, therefore, proposed to equip each of the two new reduction plants with equipment for the hot-dipping of half of its production, leaving one-half of their reduced plate to be transferred to existing hot-dip plants in the area until a decision can be made on the methods to be employed. In the layout, each of the two new works is to make ample provision for the installation of either electrolytic or hot-dip equipment for the whole of its capacity.

Sheets: The cold reduction of sheets at Ebbw Vale is to be maintained.

It is proposed that the three-stand continuous mill, 80 in. wide, recently installed at Lysaghts, Newport, shall be provided with more powerful drives to increase its speed of operation and output, and to install the necessary equipment for the manufacture of full-finished sheets up to 72 in. wide for the automotive and other industries. The hot-rolled coils for this production will be provided by the two continuous hot mills. Developments are also planned for improved methods of manufacture of steel sheets for the electrical industry, with special reference to the higher qualities.

Rails and Sections: It is proposed that the manufacture of heavy plates at the Guest Keen Balwins Port Talbot works shall be discontinued. The tonnage of

plate up to 0.75-in. thickness should be transferred to their new strip mill at Margam and the heavier plates to other areas.

The present Port Talbot ingot tonnage is to be maintained and the displacement of plates made good by improvements to the rail-making capacity and rolling the ingots into rails and sections. Port Talbot is being proposed as one of the four centers for the suggested concentration of rail production.

Billets: The Guest Keen Baldwins works at Cardiff are of modern construction, and it is proposed to maintain them in operation for the manufacture of billets for rerolling and medium sections. It is anticipated that with the improvement in quality of the pig iron arising from the use of an addition of foreign ore to the Oxfordshire stone, the production of ingots will be at the designed level of 504,000 tons per year. The mill has a capacity greater than this tonnage, and it is proposed to supplement the Cardiff ingot production by about 112,000 tons from other works in Wales, as the local capacity cannot be readily increased. This total steel rolled into blooms and billets is estimated to yield about 448,000 tons of billets for rerolling and 89,600 tons of sections. The local re-rolling mills of the associated company are estimated to absorb the whole of the billet production.

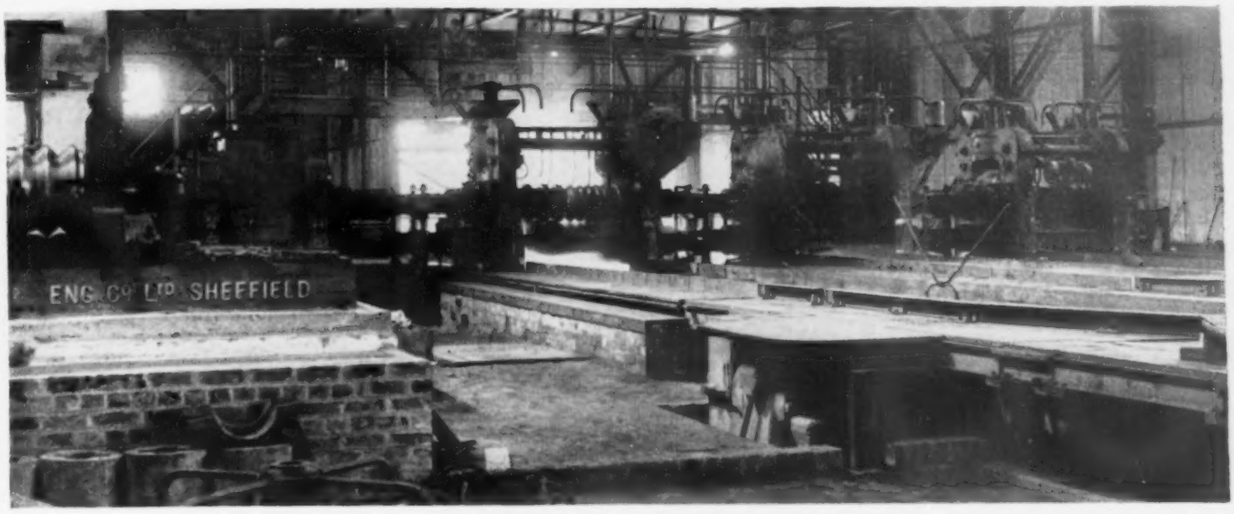
Summary of Steel Position: The total nominal capacity of the South Wales steelworks with the proposed additions at the strip mills is estimated at approximately 4,368,000 tons, of which 2,072,000 tons will be required for rolling into hot strip and plates, and about 840,000 tons for rails and sections and for billets from the modern continuous mill. A further quantity will be required for rolling the remaining tonnage of tinplate and sheets which will still be produced by the hand-operated mills which are to be retained beyond this first stage of reconstruction. This is estimated at about 616,000 tons of ingots.

The electric furnace capacity is estimated at 39,200 tons. No additions are suggested, and it is anticipated that the local trade may absorb 21,280 tons, leaving 17,920 ingot tons available for use in other districts.

Round ingots for tube-making will absorb a further 56,000 tons.

These various purposes absorb a total of about 3,640,000 tons of ingots, leaving a surplus nominal capacity of 728,000 tons.

In the early stages of the changeover from the old methods of sheet and tinplate manufacture to the new plant, it is possible that part of this surplus capacity may be employed to fill up the deficit of 392,000 tons of billets for the re-rollers in South Wales.



SHORT TERM INVESTMENT: *Though the works itself will eventually be scrapped under the terms of the British Iron and Steel Federation report, some investment will be made in modernization for rail production until new larger production units in the area are in full swing.*

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NORTH EAST COAST (Area Surrounding Consett, Cleveland, West Hartlepool): This area is the center of the heavy type of commercial steel production. Its present capacity of about three million ingot tons represents 22 pct of the total capacity of the country.

Pig Iron: Due to the depletion of local ores and the distance from the Midland ore reserves, the district has to rely on larger supplies of foreign ores. Developments must be on the seaboard or direct on the coal. The blast furnaces at Consett, Durham, located on the coalfield are already in process of modernization and an ore preparation plant has been installed. The new plant will consist of two large furnaces in place of six old furnaces.

Dorman Long have in hand an approved plan for the building of a wharf for the efficient unloading of foreign ore and of handling equipment. Proposals are made for the rebuilding and enlargement of the blast furnaces at their Cleveland works to secure reduced operating costs and maximum fuel economy.

The Cargo Fleet Co. is already provided with dock facilities for unloading ore and with an ore preparation plant. The blast furnaces as well as the steelmaking plant of this company and of the South Durham Co. at West Hartlepool require rebuilding. It is considered desirable that this capacity should be concentrated and replaced by modern furnaces with additional coke oven capacity. It should form the basis for the billet plant referred to below.

Steel Ingots: At the present

TABLE II—Blast Furnace Capacity

Basic and Hematite in Net Tons

	Present Capacity	New Building	Future Capacity	Increase
South Wales	1,344,000	672,000	1,792,000	448,000
N. E. Coast	2,464,000	1,736,000	2,632,000	168,000
Scotland	728,000	672,000	1,008,000	280,000
N. W. Coast	728,000	.....	728,000	.....
Sheffield	168,000	.....	168,000	.....
Lancashire, Flintshire, etc.	280,000	616,000	672,000	392,000
Staffordshire, etc.	448,000	.....	280,000	168,000 (reduction)
Lincolnshire	1,344,000	672,000	1,568,000	224,000
Northamptonshire	694,400	952,000	1,344,000	649,600
	8,198,400	5,320,000	10,192,000	1,993,600

time steelmaking is carried on in nine different plants; the modernization plans envisage the concentration of the industry into five works, each of which will be an integrated unit making as far as practicable a single type of product.

Plates: The Consett rolling mills are to be remodelled for the manufacture of medium and heavy plate, and will give up the rolling of rails, billets and sections. Additions to the steel furnaces are planned and a second large blast furnace is under construction to give a balanced pig iron, steel and plate-rolling works.

The Redcar works of Dorman Long will continue as a plate-rolling unit, and the South Durham light plate mill at West Hartlepool, which is in the main an efficient unit, should be improved to take care of the whole district production of light plates, plus some tonnage of medium plates for the limit of the useful life of the mill.

Rails, Joists and Sections: The North East Coast is the largest rail producing area in the United Kingdom. It is proposed to concentrate the whole output in the Cleveland works of Dorman Long and to install modern finishing and handling equipment for economic production up to 224,000 tons per year.

A new works will be built by Dorman Long for the manufacture of broad flange beams, which are required to meet the modern developments in structural engineering design. It is proposed to erect a modern Grey beam mill, complete with the necessary steelmaking furnaces, with a capacity of 420,000 ingot tons to meet this demand. At the same time the existing Britannia works of Dorman Long will be scrapped. The new steelworks will be built on a new site, already acquired, lying between the present Redcar and Cleveland works, alongside the railway and adjacent to the proposed new docks on the south bank of the Tees River. This new development is designed as the first step in the reconstruction of the Dorman Long steelworks. Each of the existing plants is to be replaced by a modern unit on the new site as and when they become obsolete or worn out.

It is proposed that a modern continuous billet mill and steel furnaces should be installed in the area with a capacity of 728,000 ingot tons. They will provide the main bulk of the total billet requirement of the area, including the maintenance at a full capacity basis of the New Jarrow continuous bar mill and the new window section mill at the Darlington works of the Darlington and Simpson Rolling Mills. The operation of this new billet mill will involve the ultimate closing down and scrapping of the Acklam plant of Dorman Long now rolling billets. The old mill will provide until the full capacity is developed at the new plant a reasonably efficient concentration of billet production in a specialized plant. The site for this plant, as well as the speed of the concentration program, will depend upon cooperative and technical arrangements still to be worked out between Dorman Long, Consett, Cargo Fleet and South Durham.

It is considered that while the Skinningrove Company's works fulfill an important function in the present economy and operate on a manufacturing cost basis which bears favorable comparison with many other works, no permanent future can be seen for this works in the long-term plan. The steel production capacity of Skinningrove will be required for a term of years until the long-term arrangements are in full operation and certain expenditure will be necessary to maintain the works in operation, but it is considered that such expenditure should be regulated by the limited possible life and should not in any case be in conflict with the long-term planning.

SCOTLAND: The Scottish steelmakers prewar had a capacity of about 2,240,000 tons and in 1937 produced 2,128,000 tons of ingots and castings. It is proposed that in the present developments Scotland shall make provision for this same proportion of the steel production of the country and for this purpose the capacity shall be raised to about 2,576,000 tons.

Pig Iron: In the past owing to its favorable position as a transit center, the Scottish area has relied to a greater extent than the average for its steelmaking matrials upon imports from abroad and other parts of Britain. In the changing conditions it has been recognized that the local industry must be made more self-contained. Just before the war, equipment for the manufacture of basic pig iron was erected by Colvilles at the Clyde Iron Works to take the place of furnaces at their Glengarnock and Clyde Iron Works, which were worn out. This machinery comprises modern coke ovens, ore crushing and sintering equipment and two modern blast furnaces, each of 224,000 tons capacity per year. A further blast furnace is under construction. These three furnaces will have a combined ca-

TABLE III—Capacity by Sections of the Industry

	Present Capacity Tons	New Building Tons	Future Capacity Tons	New Building as Pct of Future Capacity
Blast furnaces (basic and hematite)	8,198,400	5,320,000	10,192,000	52
Steel furnaces	15,792,000	6,535,200	17,864,000	37
Billet mills	4,144,000	2,464,000	5,040,000	49
Plate mills	1,960,000	560,000	1,960,000	29
Joists, rail and heavy section mills	2,800,000	728,000	2,800,000	26
Sheet and tinplate mills	2,688,000	1,232,000	3,024,000	41
Wire rod mills	756,000	168,000	840,000	20
Light section bar and strip mills	2,800,000	952,000	3,136,000	30

pacity of about 672,000 tons of steelmaking iron per year. This in itself does not cover the requirements now anticipated.

In addition, the existing blast furnaces engaged in the manufacture of hematite and foundry iron at the Bairds and Scottish Gartsherrie Works and at the other makers in Scotland are now obsolete and are due to be replaced by modern units with a capacity of approximately 448,000 tons per year, with the necessary facilities for ore preparation and sintering.

Further, none of the existing ports in Scotland can be regarded as being provided with adequate facilities for the handling of the large tonnages of imported ores required. Such facilities are now an economic necessity owing to the increasing cost of dock and other unskilled labor.

The overall position with regard to this replacement of pig iron capacity, together with the necessary ancillary equipment and ore unloading facilities, is under review to determine the extent to which these plants should be scrapped and rebuilt as a part of the proposed new blast furnace and steel plant to be built on the Clyde.

Steelmaking: Approval has already been given to proposals for the extension of the steel and tubemaking machinery of Stewarts and Lloyds to meet the increased demands for tubes in the export trade, and this work is in hand.

It is proposed to replace the basic openhearth furnaces of Colvilles at Dalzell by a modern installation on a new site adjacent to the present works. The Dalzell works are manufacturers of special quality steels and large sizes of blooms and rounds, and in the proposed rationalization of the heavy plate industry this works will be the only producer of the largest sizes of commercial plates. It is envisaged that this plant will continue to form an integral part of the steel industry for a considerable period and must be provided with adequate steelmaking facilities. The present furnaces are worn out and proposals were being developed at the outbreak of the war to rebuild them. The conditions during the war have compelled the deferment of this work, but this replacement is now one of extreme urgency.

At the remaining Colville steelworks at Glenarnock, Lanarkshire and Clydebridge, where improvements were made prior to the war, a limited expenditure will be incurred, though the possibility will exist of displacing one or more of these units by the new Clyde equipment as economic factors and the condition of these plants show this to be justified.

The steelmaking plants of the Steel Co. of Scotland at Hallside and Blochairn, amounting to a capacity of 364,000 ingot tons, and part of the Colville Clydebridge capacity will be scrapped. New construction is required to replace this capacity and to meet the overall increase in demand.

The foregoing proposals regarding existing works are in line with the general policy adopted when the managements of the principal Scottish steel works came together in 1936. They provide a basis for a long-term policy based on constructing improved dock facilities for handling imported ore, ore preparation plant, new blast furnaces and new and increased openhearth capacity at a new plant on a riverside site.

It is proposed that this plant, in its initial stage, should include a modern continuous billet and sheet bar mill to make the sheet and re-rolling industries of Scotland self-contained and have sufficient re-rolling mills to replace the existing light section and bar mills of the Colville group. It should also include a four-high plate mill to roll all the light plate produced in Scotland.

This new plant, while designed to meet the present known requirements, would be laid out as a nucleus around which the future developments of the Scottish steel industry will be planned as soon as economically practicable, having regard to the efficient balance and life of the existing plants on other sites.

The progressive rationalization introduced into the industry in Scotland in 1936 has already secured economies by concentration of loads on individual firms, but proposals are made for further improvements at individual plants to secure better operation at the more efficient of the existing works as, for example, the concentration of rail and sleeper manufacture at Glengarnock and the concentration of the heavy section and joist trade at Lanarkshire, with the consequent closing of Hallside as a rolling mill.

In the case of the Bairds and Scottish Steelworks it is proposed in the interim period to maintain the works in operation but to examine the possible interchange of orders to secure more efficient loading and greater economy.

Proposals for the improvement and extension of the steel foundry at Beardmore's at Parkhead, for the manufacture of the heavy machinery required for the modernization of the industry are under construction. Arrangements for the manufacture of the heavy forged rolls for the new continuous hot and cold strip rolling mills are also

CONTINUE TRANSSHIPING: *Located on the Lincolnshire orefield, the Richard Thomas and Baldwins Redbourne works is being modernized, and under the proposals of the British Iron and Steel Federation will continue to produce billets and slabs for the continuous strip mill at Ebbw Vale. Cautious wording of the plan recognizes the ineconomies of such shipment and reflects the possibility that the system may be altered in the future.*

completed. It is proposed to reconstruct the steel melting shop at Parkhead to effect economies in the manufacture of openhearth steel for the foundry and forge and to keep pace with the British Admiralty requirements for armor suitable to the needs of the postwar fleet. This will involve the replacement of certain of the openhearth furnaces with electric furnaces of large capacity when the Admiralty plans for heavy armor have been developed. The capacity and type of the steelmaking furnaces in this works will be determined primarily by the requirement of the product, as regards quality and size, rather than by considerations of the mass production of low cost ingots.

MIDLANDS (Area surrounding Lincolnshire, Lancashire, North West Coast): In view of the interrelation between the various Midland districts, it will be convenient to consider the modernization plan for this area as a whole. This section therefore covers the Lincolnshire, Northamptionshire, Sheffield, Staffordshire, Lancashire, Flintshire and North-West Coast districts. This area produces over 40 pct of the total British steel production and owing to the variety of type and quality of product, the integration of the plans for the area as a whole presents more difficulty than in the other areas. It is considered simplest to set out the proposals in relation to the main types of product made.

Tubes: The tube industry is already presented with an increased demand for export, and plans have been prepared to meet this. Coincident with this, extensions are being undertaken to the modern plant of Stewarts and Lloyds at Corby, Northamptonshire, for the production of 134,400 tons of openhearth steel based on the works' own scrap and of a further 128,800 tons of basic bessemer steel based on Northamptonshire ores.

Sheets: The initial unit installed at the Shotton, Flintshire, works of John Summers & Sons, just prior to the war, for the manufacture of sheets by the modern methods of continuous hot-rolling and cold reduction, came into production at the beginning of the war. Due to the incidence of the war the machinery has not been completed, and extensions and improvements are proposed to raise the capacity to 560,000 tons of sheet per yr with further developments to follow later.

These proposals, in addition to improvements in the mills, include the replacement of the obsolete and inadequate melting shops by a completely new shop with an initial capacity of 672,000 tons of ingots. It will be laid out so as to permit extensions later up to a total of 1,008,000 ingot tons.

The pig iron used in steelmaking for the present production of sheet at Shotton, is made in the blast furnaces of the Summers Co. at Shelton from Midland ores. The steel required for the modern standards of sheet quality cannot be made without difficulty from pig iron of this type and it is necessary to create new blast furnace capacity. These furnaces should be provided with a large proportion of imported ore in the burden, and this ore would be received through the port of Birkenhead on the Mersey, which is some 14 miles from Shotton.

It is recognized that the Shotton plant is not situated in so favorable a position for the assembly of the raw materials, coking coal and ore, as some of the other coastal plants, therefore, it is visualized that this plant will operate on a rather higher proportion of scrap than for the country as a whole.

The proposals involve the improvement of the dock facilities for unloading ore at Birkenhead, and the complete integration of the Shotton works to include ore preparation, coke ovens and blast furnaces, as well as the new steel furnaces.

The erection of two new blast furnaces will provide some surplus of pig iron until the full steelworks extension is completed. In the meantime, this iron will find a ready market, making it possible to put out of operation two old blast furnaces at Shelton.

Wire and Wire Products: An integrated production of wire has been successfully developed by the Lancashire Steel Corp. based on their iron and steel works at Irlam. Britain has not, up to the present, been self-supporting in the supply of wire rods and rod billets. Plans have been prepared to install continuous rod mills, one at Irlam integrated with the steel and billet plant to replace the mill at Warrington, and the other at Richard Johnson and Nephew's works at Manchester integrated with their wire mill; both of these developments will increase capacity. This will increase the demand for home produced rod billets, and it is proposed to install a continuous billet mill at Irlam to supply the required tonnage. The present production of rails and heavy sections is not large enough to give efficient production, and it is proposed to transfer this to other works to secure economic loads. Further pig iron and steelmaking capacity will be required at Irlam to give full billet mill and wire rod mill operation.

Proposals for the installation of a further wire rod mill in conjunction with the new billet mill at Lysaght's, Scunthrope, are under examination.

Rails: The manufacture of rails in this area has until now been carried on in three different works and is to be concentrated in the works of the United Steel Companies at Workington on the Northwest Coast, which will operate solely on this product, together with a small tonnage of billets which are specified as acid bessemer quailty. Proposals are included for the installation of the finishing and handling equipment necessary for the ecoomic manufacture of the required rail tonnage. A slight increase in steelmaking capacity may also be necessary.

Tires and Solid Wheels: The tire mill of Taylor Bros., Manchester, has reached the end of its useful life, and proposals are made to replace it by a new mill embodying the latest developments. These proposals represent a renewal of existing capacity and the maintenance of efficient production. A similar modernization will take place at the tire and wheel mill at the United Steel Cos.' Steel, Peech and Tozer works.

Heavy Sections: The largest producer of heavy sections in the Midland area is the Frodingham works of the United Steel Cos. These works, based no the local Frodingham and Midland ores, are now in need of replacement by more efficient equipment. It is proposed to erect two large blast furnaces in line with two similar furnaces built in 1939; a completely new openhearth furnace shop on an adjacent site so as not to interfere with current production; to replace the cogging mill, and to rebuild the section mills to give completely modern machinery for the production of sections.

At the Round Oak Steel Works it is proposed to replace the two obsolete melting shops by a modern shop with a total capacity increased to 280,000 ingot tons per year; a new cogging mill will be installed and the section mills for the rolling of light and medium sections improved. This works is favorably placed for scrap supplies, near to the Birmingham market and produces a specialized range of products.

Billets: It is estimated that the demand for billets and slabs for re-rolling into light sections, strip and wire rods in this area will amount to about three million tons.

Two existing modern mills with a total capacity of about one million tons are already in operation at the Templeborough works of the United Steel Cos. and the Corby works of Stewarts & Lloyds, and, as indicated above, a continuous mill is to be installed at the Irlam Works of the Lancashire Steel Corp.

The Park Gate Co. proposes to discontinue the manufacture of plates and sheets and to concentrate its rolling on the production of billets ad light sections. A new rod and bar mill is proposed.

RIGHT

NO MORE RAILS, BILLETS, SECTIONS: *The Consett iron works at Durham on the Northeast Coast of England are scheduled to be remodelled for the manufacture of medium and heavy plates. The drastic rationalization plan will require this plant to give up rail, billet and section production.*

LEFT

MORE BILLETS: *The Guest Keen Baldwins Cardiff Works in South Wales will be maintained for the production of rerolling billets and medium sections. When fully developed this unit should produce 400,000 long tons of billets and 80,000 long tons of sections per yr.*

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On the Lincolnshire ore field, the Richard Thomas and Baldwins works at Redbourne are already making detailed improvements to their blast furnace equipment to maintain output, and it is planned for the present to continue the production of billets and the rolling of slabs for the continuous strip mill at Ebbw Vale.

Lysaght's works at Normanby Park are in urgent need of rebuilding, and the proposals provide for improvement of the ore preparation machinery, two new blast furnaces, new and larger steelmaking furnaces and a modern continuous mill for the production of billets. Consideration is being given to the establishment in this plant of a modern wire rod mill which in all probability will be needed to meet increasing export demands for wire. The production proposed for this works is about 448,000 ingot tons in the first stage, with possible extensions, or the equivalent of 392,000 tons of billets.

The Midland area calls for an increased production of some 560,000 tons of billets per yr within the expanded production program, and also is the area in which the largest quantity of billets is needed for re-rolling outside the works of the primary producers.

The proposals provide for this increased demand to be met in the main by the installation of a new plant on a new site based on home ores. On account of the relative resources, and the developments planned in Lincolnshire, this new enterprise schould be based on the Northamptonshire ore reserves.

The plant will provide for preparation of the ore, coke ovens, blast furnaces, steel equipment, cogging mill and a continuous billet mill with a capacity of half a million tons of billets.

Finishing mills will also be laid down to roll about two fifths of the billets into finished products. This will provide the basis of a plant integrated from ore to billet and re-rolled product.

The balance of billets would initially be supplied to the independent Midland re-rollers. The longer term policy will involve a review of the desirability of further concentration of re-rolling production, including development on the site of the new plant.

Even at the outset, many questions of a social and economic character, including housing, will need special consideration, and may well determine the date at which the plan should proceed.

The proposed plant will be sponsored by the United Steel Cos. and Stewart & Lloyds.

DEMAND FOR STEEL UP: Home Requirements. There has been a marked long-term upward movement in the domestic use of steel in the United Kingdom. During the period from 1910-14 domestic consumption was running at just over five million ingot tons a yr. This rose to an annual rate of 8.5 million ingot tons over the period 1927-31 and to 11.8 million tons in the five yr 1935-39.

The peak figure reached was a consumption of 12.9 million tons in 1937. In most of the prewar years, demand was considerably below the level which would be expected under conditions of domestic full employment, except possibly in 1937. There may have been that year some overbuying which would not be expected under conditions of stable demand.

It is considered that on a full employment basis home demand before the war would have been at least 12 million ingot tons. With further progressive mechanization and a rising standard of living, it is anticipated that the prewar upward trend of steel consumption will continue. This trend may not be so strongly marked as in the past if allowance is made for a slowing up in the increase, and eventually some decline in the working population of the country. It is estimated that home consumption by 1950-55 will have reached approximately 14 million ingot tons per yr if a high level of employment is secured.

This would mean an annual steel consumption of 1850 ingot lb per head of the insured industrial population. Consumption was running at about 1000 lb per head of the industrial population in the earlier years after the last war; it rose to 1450 lb per head in the middle of the period between the two wars, and had reached 1700 lb per head towards the end of the inter-war period. It would appear therefore that the figure of 14 million tons does not represent an over-estimate of probable demand.

Export Requirements: Steel exports before the last war and toward the middle of the inter-war period ran at approximately 4 million ingot tons per yr. They fell to 2.8 million in the years just prior to the war. While world demand for steel is likely to rise considerably, the progressive development of steel industries in other countries may make it difficult to increase the total tonnage of direct steel exports apreciably over the prewar figure.

Nevertheless with the curtailment of Germany's exports and the increasing need for England to secure the maximum export, it would seem reasonable to assess the export demand at 3.3 million ingot tons a yr. The proportion of more highly finished forms of steel in this tonnage will be increased. In addition, part of the increase in home requirements will go into a very wide range of manufactured products for export.

On the basis of 14 million tons home and 3.3 million tons export demand, total ingot requirements will be 17.3 million tons.

STEEL IMPORTS — STATIC: Prewar arrangements provided for an annual import of some 560,000 tons of steel from the Continent and in most years an appreciably larger tonnage was in fact imported. With the curtailment of production in Germany, it is doubtful whether over a period a substantial import from the Continent should be assumed for the future.

The plans submitted in this report envisage an effective capacity in this country of approximately 17,900,000 tons of ingots and metal for steel castings. A high utilization of the plant would be obtained with a production of 16,800,000 tons. This would mean production running at 94 pct of capacity and would involve an import of 560,000 tons of steel when demand conditions were reasonably normal.

The building program outlined does not mean that a 16.8 million ton output could not be appreciably exceeded if necessary. Allowance has been made for a considerable tonnage of old equipment to go out of production with the building of new plants, and some part of this capacity could be retained for a further period if a higher output were needed. On the other hand, it will not be possible to make a start on some of the major construction work for three or four yr.

Should it then appear desirable to budget a different home production, readjustment in the program could be effected. At this stage, however, it will be assumed that an efficient capacity of 17,900,000 ingot tons should be aimed at with production from this capacity of about 16,800,000 ingot tons, including about 448,000 tons of metal for steel castings.

SCRAP — CONSERVE DOMESTIC: In view of the high cost of coal it is important to use the full available quantity of scrap. The percentage of scrap used in 1937 amounted to approximately 75½ pct of the ingot output. Thirty-seven and a half pct was process scrap and this percentage may be presumed to be maintained. The balance (20 pct) was "old scrap." In 1937 it was necessary to supplement home scrap supplies by the use of about 840,000 tons of imported scrap.

It is likely that the supply of "old scrap" from demolition and other sources will continue the upward trend which was in evidence over a long prewar period.

The various factors affecting scrap supplies led to the view that a production of 16,800,000 ingot tons of steel could be based on a 55 pct scrap usage, involving an import of not more than approximately 280,000 tons of scrap. This import figure assumes that all available home scrap is conserved for use in Britain.

At present it appears improbable that over a period of years more than the estimated import of 280,000 tons could be secured from abroad, but temporarily large imports of war scrap might be obtained from the Continent. They would greatly assist in the transi-

tion period until the additional pig iron facilities are created.

The United States, which prewar was the main source of imported scrap, will probably wish to use a greater proportion of its own scrap as the domestic ore position gets gradually more difficult.

It has also to be borne in mind that the average cost of imported scrap has rarely been significantly below the home cost of pig iron. While therefore there is great economy in making the fullest possible use of United Kingdom domestic scrap resources, there is not likely to be much cost advantage in importing substantial quantities of scrap from the United States even if this were available.

Assuming a 55 pct scrap usage, it would be necessary to provide 53 pct of ingot production from pig iron, thus giving a total metal consumption of 108 pct to allow for the loss in melting. A 16,800,000-ton production would therefore need 8,960,000 tons of pig iron.

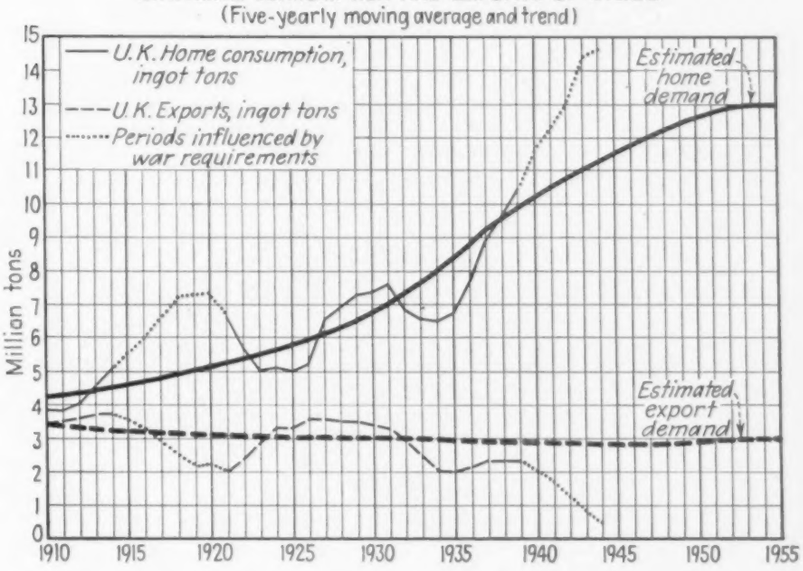
PIG IRON—CAPACITY UP: Approximately 7.8 million tons of the pig iron required will be basic and about one million tons hematite. In addition to the tonnage of hematite required for steelmaking, a further 560,000 tons will be needed for ingot molds and special classes of iron castings.

Before the war foundry pig iron production was below two million tons a yr, based mainly on Midland high phosphoric ores, and about 560,000 tons of imported ores.

Before the war exports of hematite pig iron were usually balanced by the import of a similar small tonnage of basic iron, except in 1937 and to a less extent in 1936, when substantial tonnages of basic iron were imported from India and the United States. Pig iron from the United States is likely to be higher in cost delivered to the United Kingdom than pig iron produced at home. In the case of India, substantial quantities were for a time available as the pig iron capacity of the country was appreciably in excess of its steelmaking capacity. This position has now changed and it is unlikely that any considerable imports will be available from India.

The possibility of Continental supplies depends primarily on the relative cost of coal on the Continent and in the United Kingdom. Having regard, however, to the extra carriage cost in using imported iron and the disadvantages of operating with cold pig iron, it would seem unlikely that imported iron would offer any decided advantage over British iron.

U.K. HOME CONSUMPTION AND EXPORTS OF STEEL
(Five-yearly moving average and trend)



It is considered therefore that basic and hematite pig iron in the United Kingdom should be built up to 9½ million tons a yr, requiring a capacity of about 10½ million tons compared with the present capacity of approximately 8,176,000 tons. As in the case of steel, some of the plans which are proposed for the second part of the five-yr period could be readjusted if, when conditions are more settled on the Continent, it appears preferable to base a proportion of United Kingdom steel production on imported pig iron.

COAL — REDUCE NEED: The steel and steelmaking pig iron industry uses just over 22 million tons of coal a yr. It should be possible for the substantial future increase envisaged in pig iron and steel production to be achieved with a minor increase in the quantity of coal used.

There are two main considerations regarding coal supplies which should be specially referred to. The first is the importance of securing continuity in the supply of adequate quantities of coal of suitable quality. The second point is the need to conserve cooking coal resources, in view of their great importance in the long-term development of the industries where they are particularly needed.

LOCATION — NEW IMPORTANCE: The primary factors affecting the location of the iron and steel plants are the relative costs of home and imported ore; the required quality of finished product; the cost and quality of coal and coke delivered to various producing centers; the full economic utilization of gas; distance from markets; availability of personnel, houses and social amenities. The action of these factors on the cost of the finished product involves a series of complicated calculations for any given location, and generalization is difficult.

The British domestic ore used for basic pig iron making is considerably less costly per unit of iron content than the higher grade imported ore, but there is a larger capital investment involved and a higher fuel consumption in smelting the home ores. While cost considerations on balance do show some advantage to steel based on British domestic ores, technical factors make it necessary to envisage certain types of steel production being developed to an increasing extent on the richer imported ore.

Thus there are two main influences tending to determine the future movements in the location of steel plants — technical factors which increase the desirability of locating plants using imported ore on coastal sites, and cost considerations which make it desirable to increase the proportion of the commoner steels, particularly billets, which are on a home ore basis.

TABLE IV—British Production of Heavy Rails 1937

	Tons
Lancashire Steel Corp.	42,416
Cargo Fleet Iron Co.	53,209
Consett Iron Co.	11,496
Dorman Long and Co.	98,647
Skinningrove Iron Co.	23,423
Colvilles	33,707
Steel Co. of Scotland	14,815
Shelton Iron and Steel Co.	16,265
Guest Keen Baldwins	86,172
Barrow Hematite Steel Co.	43,210
United Steel Co.'s, Workington	95,950
Total	519,312

A limit is set on the extent to which additional production should be developed on a home ore site by the extra carriage incurred if a disproportionate amount of steel is produced in one location. In addition, there is a limit to the quantity of suitable home ore available at an economic cost for the permanent maintenance of a substantial steel industry. These considerations appear to confine the extension of steel output on a home ore basis to a maximum figure of 1,120,000 tons.

In view therefore of both the limited home ore reserves and the geographical advantages of the coastal sites, it is of the greatest importance for the future competitive strength of the industry that every effort should be made to secure imported ore at not more than the cost of comparable high grade ores in America.

On the basis of these proposals, the requirements for pig iron production would be 8.4 million tons of imported ore and 14 million tons of home ore.

SECTIONS OF THE INDUSTRY: Table II sets out the blast furnace capacity in each of the districts at present and after rebuilding. Table III summarizes the total building program in various sections of the industry and shows this program as a percentage of the future capacity in each branch of the industry. The table indicates some of the directions in which the main emphasis is placed under the rebuilding program.

Pig Iron: Blast furnace construction is particularly large in relation to the normal rebuilding in a five-yr period. The increase in the rate of 5,320,000 tons is largely a reflection of the effort to reduce fuel consumption to a minimum. About 3,360,000 tons of the present pig iron production is obtained from furnaces of efficient size and mainly constructed in the years just prior to the war. The program represents the maximum rate of development which is likely to be justified, and when completed will provide a capacity fully adequate to meet the estimated production requirement of 9,520,000 tons.

Billets: Another section in which a high grade of building is planned is the production of billets. Five new continuous billet plants are proposed; one each in Lincolnshire, Northamptonshire, Lancashire, on the Northeast Coast and on the Clyde. They will have a total capacity of 2,464,000 tons and will serve the needs of each of the main billet-using districts with the new Northamptonshire plant primarily meeting the previously unsatisfied Midland demand.

With the existing 1,680,000 tons of modern continuous billet plant there will be a total production of billets by continuous mass production methods of 4,144,000 tons.

Plates: Two new four-high plate mills are to be built, one in Scotland and one at Consett. Provision is also being made for the rolling of 112,000 tons of thin plates on the new continuous strip mill.

Joists, Rails and Heavy Sections: The main development in this field is the broad flange beam mill of 392,000 tons capacity. In rail production the main proposals are for the concentration of output and improvement of finishing facilities. This development is not reflected in the figures in table III which show only the building involved in the putting down of entirely new mills.

TABLE V—Estimated Future Production of Heavy Rails

	Tons
Colvilles	140,000
United Steel Co.'s, Workington	212,800
Dorman Long	224,000
Guest Keen Baldwins	151,200
Total	728,000

There has been no major technical change in the production of heavy sections. A complete modernization of the Frodingham section mills will, however, be undertaken.

Sheets and Tinplate: The main developments in sheets and tinplates are the installation of the new continuous strip mill in South Wales with further cold finishing mills and the development of the existing mill at Shotton. At the beginning of the war about a third of the trade had been modernized by the continuous mils. The present immediate proposals will bring this proportion up to about 75 pct. In the meantime certain of the existing mechanical and hand mills will meet the balance of requirements.

Wire Rods: In the case of wire rods, 70 pct of the production is already undertaken by modern continuous methods. The proposed modernization will increase this to about 85 pct.

Light Bars and Strip: There are 125 firms in this section of the industry widely distributed and employing in total a considerable labor force. Demand for this class of material is likely to increase, and it is proposed to build mills with a capacity of 560,000 tons to be integrated with the continuous billet mills previously referred to. Limited development will be undertaken also at the nonintegrated plants to meet local specialized and small-scale demands.

At the same time steps will be taken to insure that in the rolling of bulk quantities of carbon and alloy material, orders of a suitable type are executed in mass-production plants. With the existing 1,120,000 tons of capacity at the continuous mills, over half the production will in future be undertaken by such plants. The extent to which further concentration and integration with the billet plants is desirable requires careful review in relation to the wide range of very varied demands falling on this section of the industry.

Wire, Bolts and Nuts, Alloy Steel, Forgings and Steel Castings: The wire and bolts and nuts industries are partly integrated with the steel plants, but the demands on them are so varied that smaller units catering to limited markets can form an efficient part of the industry. Both products have been in heavy demand during the war and no major increases in capacity is at present planned.

In the case of alloy steel, forg-

TABLE VI—Fuel Consumption
Tons of Coking Coal per Ton of Pig Iron

1913	2.29
1929	2.12
1937	1.84
1950 (estimated)	1.51
Percentage decrease 1913/1950	34 pct

ings and castings, the expansions to meet war demands have been so great that the major problems to be faced are not problems of rebuilding or extension of capacity.

LOADING OF MACHINERY: In drawing up the plan, careful consideration has been given to insuring the full loading of efficient machinery. The approach to this question has been first to insure the efficient planning of production in each of the districts and second to insure the proper relationship of capacity between districts.

The Northeast Coast Developments may be taken as an illustration of the district concentration of production. In this area there are at present nine different steelworks. Dorman Long have four; Cargo Fleet and South Durham three; Skinningrove one and Consett one. Four of these works produce rails; three plates; five billets and five heavy sections. It is envisaged that ultimately the number of works may be reduced to five; two would be concentrated solely on the production of plates; one on the production of heavy structural material; one on billets and light and medium sections rolled from billets and one on rails, with the balance of its production on special billets which can conveniently be interlocked with the major tonnage of rail production. A similar degree of concentration will be secured in other districts.

On a national scale the effect of the plant developments in securing the concentration of production may be illustrated by examining the effect on rail production. In 1937 heavy rail production, excluding a small tonnage of sleepers, was distributed as shown in table IV.

The modernization will enable plants to be specialized and will result in the distribution of tonnage, including an expanded demand for sleepers, approximately as shown in table III.

At an intermediate stage pending the full completion of the Northeast Coast plans and the ability to concentrate rail production at the Cleveland Works of Dorman Long, it will be necessary to continue production for some time at the Skinningrove Co. Small expenditure is therefore being incurred to increase efficiency in handling and finishing of rails at this company. The full benefits of this limited expenditure will be realized over the interim period during which rail production is carried on there.

A similar rationalization of production will be achieved in heavy sections, plates, sheets and tinplates, as well as in billets, where eight continuous mills will produce 4,144,000 tons or over 90 pct of the output of ordinary billets. Where a steel producer is asked in the interests of concentration to cease the manufacture of a particular product, examination will be made of the possibility of the manufacture by him of other products for which his plant is suited, provided such products can be made efficiently.

The tonnages involved in these various branches of the industry are larger than in rails, and the full concentration of production which may ultimately be necessary will not in all cases be secured from the plans for the next five yr. The proposals, however, represent for each product a drastic approach to the rationalization of production and give a rate of development of efficient and concentrated production which could not wisely be exceeded. The principle of the full loading of efficient plants is the fundamental basis on which the mod-

(CONTINUED ON PAGE 140)

MORE STEELMAKING AT CORBY: *New steelmaking capacity now under construction at the Stewarts & Lloyds works at Corby in the Midlands district of England will match openhearth and bessemer production at approximately* 130,000 *tons per yr. The basic bessemer steel will utilize Northhamptonshire ores.*

MACHINE TOOLS

. . . News and Market Activities

UNRRA Seeks Ways to Buy Surplus Tools

• • • **Supplementing UNRRA's** growing interest in government-owned surplus machine tools, representatives of the machine tool industry met with UNRRA and Treasury Dept. officials last week to explain to what extent machines could be bought from surplus for UNRRA, and the best way to go about it.

Purchase of surplus machine tools through UNRRA for reconstruction of Poland, Yugoslavia, Russia, China, and other countries, was discussed at some length in the course of several meetings, and indications are that UNRRA can use some surplus machines and will continue to earmark equipment now awaiting disposal by the War Assets Administration.

Representatives of the industry were told that almost 80 pct of the machine tool surplus has been declared, which doubtless constituted the most surprising statement during the discussions. In round figures, some 80 pct have been turned over to WAA, although they are not all on the market, and an estimated 10 pct has been absorbed. This estimate, if accurate, suggests that UNRRA should have considerably more latitude in selection than the reported 10 pct of their requirements which is all they may be able to find in the government pool.

Any move of UNRRA toward the surplus poses several problems, some of which are subject of strong feeling in some segments of the machine tool industry. Foremost is the fact that unless machines are in either new, or practically new condition, the industry would like to take them into their own shops for rebuilding before shipping them overseas. Breakdowns can hardly be classed as spurs to preservation of customer relations or establishing new friendships.

Secondly, if UNRRA's ultimate requirements should go sky-high, it is not unlikely that the machine tool builders' foreign markets, which have been showing up rather well, would be depressed. The exact extent to such a depression is difficult to evaluate for reasons given, but it must be considered a factor.

At the same time, the Treasury Dept., which does UNRRA's buying, and is accordingly subject to considerable pressure of one sort or another, had practically reached the point of deciding not to buy any new machines at all for UNRRA. This would not only be a body blow to the machine tool builders, but would make the filling of some of UNRRA's needs practically an impossibility. Some types of equipment are still in short supply in the surplus.

In a few districts, some improvement in WAA is noted by dealers and manufacturers representatives, who in the past were shuffled around a bit and emerged a little the worse for wear but as far as ever from getting their hands on any machines. According to some sources in the trade, dealers are particularly unpopular with the WAA's local offices. Despite recent exhortations to get them to sign up, the dealers have at no time been handed what might be described as the clean end of the stick.

WAA veterans' certification offices in northern Ohio and western Pennsylvania, the district included in the Cleveland WAA region, expected an avalanche of new requests to purchase government-owned surplus property as the new disposal machinery designed to give World War II vets top priority second only to the Federal Government in making purchases started to function May 13.

New surplus property legislation improving the veterans' buying position was signed May 3 by President Truman and WAA has spent the past week in setting up streamlined procedures to provide veterans with the machinery to utilize their new preferences. Certification offices in the Cleveland region are located in Pittsburgh, Toledo, Akron, Canton, Erie, and Youngstown, in addition to the one in Cleveland.

Amendment of the surplus property act provides for setting aside for sale to veterans exclusively, either for personal or for business use, selected items in heaviest demand and in short supply. It also advances to a general priority second only to that of federal agencies veterans' former preference in the purchase of any goods for use in establishing their own small enterprises.

A list of items set aside by WAA for sale to veterans exclusively includes certain types of automotive vehicles, tractors, construction, mining and excavating machinery, agricultural machinery, medical, surgical and dental apparatus and equipment, and typewriters.

Experience has been that unsatisfied veteran demand is heaviest in these lines, according to the disposal agency.

Existing procedures will govern certification. Applicants must furnish proof of honorable release from service and a description of the property sought.

Veterans holding appropriate certificates may purchase items on the "set-aside" list for their own personal use as well as for use in a small business or agricultural or professional enterprise. Certificates already on file which include items placed on the "set-aside" list will be honored whenever such items are available. However, since all items on the "set-aside" list are in critically short supply, applicants will generally be limited to a single unit.

Certification for personal use will be limited to items on the "set-aside" list. Such certification will not be made for items previously certified for use in a small business, professional or agricultural enterprise.

Application for any item on the "set-aside" list will be accepted, even though the applications already on hand exceed many times the available supply. Certification offices have been instructed to inform applicants fully regarding the ratio between the approximate number of applicants and remaining stocks of the item requested.

Whenever any item on the "set-aside" list becomes available, offerings will be made to the holders of personal use certificates in the same proportion as their total number bears to the total number of certificates on file for small business or agricultural or professional enterprise.

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Turner System Equipment in use at Allis-Chalmers Mfg. Co. Photo courtesy of the Hydraulic Press Mfg. Co., Mount Gilead, Ohio.

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NONFERROUS METALS

. . . News and Market Activities

Near End of Brass and Copper Dilemma

New York

• • • **It appears that** the copper and brass industry wage and price situation is on the verge of a solution, the details of which may still require several weeks to be worked out. The price of copper has apparently passed from the jurisdiction of OPA and is now receiving study by the Office of Economic Stabilization. In conference between officials of this branch of government and the industry, a figure of 14.375¢ per lb is the latest price objective to be worked out, superseding a figure of 14.32¢ mentioned a few days ago. The latter figure aroused considerable opposition from the industry on the basis that it did not represent a multiple of one eighth of a cent which has always been trade practice in pricing copper. OES officials are reported to have stated definitely that they would not agree to a copper price of 15¢ per lb.

Although it had been indicated earlier that the strike of workers of the American Brass Co., the only remaining brass fabricator enduring the strike, had been terminated on the basis of an agreement, it developed that the unresolved problems of the Buffalo and Detroit plants of the company would serve to continue the strike in all plants. Now, however, all points of difference are reported to have been adjusted and employees will return to work this week.

As a result of the miners strike, crude production totaled 29,379 short tons in April, less than half as much as December's 62,641, which itself represents a significant decline from that of March 1944's 101,289. Likewise, refined copper production in April 1946 totaled 18,989 short tons as compared with 66,062 in December and 99,118 in March 1944. Meanwhile, deliveries of copper to customers were fairly well maintained at 75,756 tons in April compared with December's 103,464 and March 1944's 156,083. Obviously recent month's deliveries of copper have come out of the stockpile which must have been seriously reduced.

According to a report of the Bureau of the Census, imports of copper in all forms have been seriously curtailed in recent months. The largest tonnage is imported in the form of blister copper which in January totaled 30,608 short tons. February and March imports of blister averaged roughly 14,000 tons. The four largest countries of origin: Mexico, 7000 tons; Chili, 9500 tons; Belgian Congo, 4500 tons and northern Rhodesia, 6000 tons in January fell off in March as follows: Mexico, 1700 tons; Chili, Belgian Congo and Rhodesia, none. To some extent this was compensated for by a total shipment of 9700 tons in March from Peru and Turkey.

In cathodes and other shapes 24,000 tons came in in January, 25,500 tons in February and 3898 tons in March. While Canada's shipments held fairly steady between 4000 and 5000 tons, Chili, the only other importing nation during the period, shipped 18,766 tons in January, 22,155 tons in February and 12 tons in March.

•

Dow Texas Plant to Open

Detroit

• • • **Dr. J. D. Hanawalt,** former director of metallurgical research of Dow Chemical Co. has been named general manager in a move consolidating magnesium operations under a separate executive board and management.

Simultaneously, it was announced that production of magnesium ingots at the company's Freeport, Texas, plant, closed since the end of the war, will be resumed in the near future and is expected to reach full capacity by midsummer.

Serving on the executive board of the Magnesium Div. with Dr. Willard H. Dow and Dr. Hanawalt will be G. F. Dressel, former production manager now assistant general manager, Dr. T. H. McConica III, former assistant technical director now technical assistant to the general manager; H. Freuhauf, former manager of the Bay City, Mich., foundry and fabrication plant now production manager; L. B. Grant, sales manager; and C. E. Nelson, former assistant technical director who is now technical director.

•

Base Metals Nearly Gone

Toronto

• • • **More nickel has** been produced during World War II than in all the previous 54 yr of International Nickel Co.'s existence, according to R. C. Stanley, president. The heavy withdrawals of base metals from Canadian mines in the war period is revealed by the *Northern Miner* which has just completed a search of statistics dealing with this subject. During the war, Canada produced 35 pct of its all time output of copper, 28 pct of its total production of lead and 42 pct of its total production of zinc.

Canada's total production of copper to the end of 1945 was 10,199,539,257 lb; the production during the six war years was 3,501,116,946 lb. Production of lead up to the end of 1945 totaled 8,908,870,388 lb; during the war, lead production amounted to 2,534,749,819 lb.

Canada's zinc production is not available in pounds, and thus is figured in dollars. The all time output to the end of 1945 was valued at $312,324,802. During the war, Canadian zinc production was valued at $131,119,426.

In considering the above figures one can readily see the intense production on the one hand and the exhaustion, on the other hand, of Canada's present base metal producing mines.

Nitralloy Bar Increased

New York

• • • **Nitralloy bar base prices** announced by the Crucible Steel Co. of America are presently in effect:

Nitralloy 125, type H	7.00¢ per lb
Nitralloy 135, type G	7.00¢ per lb
Nitralloy modified 135	8.00¢ per lb
Nitralloy type N	10.50¢ per lb

The prices are subject to percentage increases approved by OPA for alloy steels.

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99+%, del'd (Min. 10,000 lb)	15.00
Aluminum pig	14.00
Antimony, American, Laredo, Tex.	14.50
Beryllium copper, 3.75-4.25% Be; dollars per lb contained Be	$14.75
Beryllium aluminum, 5% Be; dollars per lb contained Be	$30.00
Cadmium, del'd	90.00
Cobalt, 97-99% (per lb)	$1.50 to $1.57
Copper, electro, Conn. valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz	$ 2.25
Iridium, dollars per troy oz.	$110.00
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9 + %, carlots	20.50
Magnesium, 12-in. sticks, carlots	27.50
Mercury, dollars per 76-lb flask, f.o.b. New York	$103 to $105
Nickel, electro	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per troy oz.	$56.00
Silver, New York, cents per oz.	70.75
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.65
Zirconium copper, 6 pct Zr, per lb contained Zr	6.00

Remelted Metals

(Cents per lb)

Aluminum, No. 12 Fdy. (No. 2)	11.00
Aluminum, deoxidizing Nos. 2, 3, 4	9.50 to 11.25
Brass Ingot	
85-5-5-5 (No. 115)	13.25
88-10-2 (No. 215)	16.75
80-10-10 (No. 305)	16.00
No. 1 Yellow (No. 405)	10.25

Copper, Copper Base Alloys

(Mill base, cents per lb)

	Extruded Shapes	Rods	Sheets
Copper	22.10	....	22.08
Copper, H.R.	....	18.60	....
Copper drawn	....	19.60	....
Low brass, 80%	....	21.43	20.81
High brass	....	....	21.48
Red brass, 85%	....	21.64	21.69
Naval brass	21.40	20.15	25.83
Brass, free cut	....	16.04	....
Commercial bronze, 90%	....	22.35	22.40
Commercial bronze, 95%	....	22.56	22.61
Manganese bronze	25.10	....	29.33
Phos. bronze, A, B, 5%	....	39.02	38.77
Muntz metal	21.15	19.90	24.08
Everdur, Herculoy, Olympic or equal	....	26.53	27.33
Nickel silver, 5%	....	30.80	28.62
Architect bronze	20.15	....	....

Aluminum

(Cents per lb, base, subject to extras for quantity, gage, size, temper and finish)

Drawn tubing: 2 to 3 in. OD by 0.065 in. wall: 3S, 43.5¢, 52S-O, 67¢ 24S-T, 71¢: base, 30,000 lb.

Plate: ¼ in. and heavier: 2S, 3S, 21.2¢; 52S, 24.2¢; 61S, 23.8¢; 24S, 24S-AL, 24.2¢; 75S, 75S-AL, 30.5¢; base, 30,000 lb and over.

Flat Sheet: 0.136-in. thickness: 2S, 3S, 23.7¢; 52S, 27.2¢; 61S, 24.7¢; 24S-O, 24S-OAL, 26.7¢; 75S-O, 75S-OAL, 32.7¢; base, 30,000 lb and over.

Extruded Solid Shapes: factor determined by dividing the perimeter of the shape by its weight per foot. For factor 1 through 4, 3S, 26¢; 14S, 32.5¢; 24S, 35¢; 53S, 61S, 28¢; 63S, 27¢; 75S, 45.5¢; base, 30,000 lb.

Wire, Rod and Bar: screw machine stock, rounds, 17S-T, ¼ in., 29.5¢; ½ in., 27.5¢; 1 in., 26¢; 2 in., 24.5¢; hexagons, ¼ in., 35.5¢; ½ in., 30¢ 1 in., 2 in., 27¢; base, 5000 lb. *Rod:* 2S, 3S, 1¼ to 2½ in. diam, rolled, 23¢; cold-finished, 23.5¢ base, 30,000 lb. *Round Wire:* drawn, coiled, B & S gage 17-18: 2S, 3S, 33.5¢; 56S, 39.5¢; 10,000 lb base; B & S gage 00-1: 2S, 3S, 21¢; 56S, 30.5¢; B & S 15-16: 2S, 3S, 32.5¢; 56S, 38¢; base, 30,000 lb.

(Continued, See Next Column)

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb or more, 46¢ a lb; 25 to 90 lb, 56¢; less than 25 lb, 66¢.

NONFERROUS SCRAP METAL QUOTATIONS

†(OPA basic maximum prices, cents per lb, f.o.b. point of shipment, subject to quality, quantity and special preparation premiums—other prices are current quotations)

Copper, Copper Base Alloys

OPA Group 1†

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
No. 2 copper borings	8.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	3.00*

OPA Group 2†

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Contaminated gilded metal solids	8.00
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.00
Automobile radiators	7.25
Zincy bronze borings	7.00
Zincy bronze solids	8.00

OPA Group 3

Fired rifle shells	8.00
Brass pipe	7.25
Old rolled brass	6.75
Admiralty condenser tubes	7.25
Muntz metal condenser tubes	6.75
Plated brass sheet, pipe reflectors	6.25
Manganese bronze solids	5.50[1]
Manganese bronze solids	4.50[2]
Manganese bronze borings	4.00[1]

OPA Group 4

Refinery brass	4.50*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 pct. [2] Lead content 0.41 to 1.00 pct.

Brass Mill Scrap†

Briquetted cartridge brass turnings	8.625
Cartridge brass turnings, loose	7.875
Loose yellow brass trimmings	7.875

Aluminum*

Plant scrap, segregated

2S solids	8.50 to 9.00
Dural alloys, solids 14, 17, 18, 24S, 25S	5.00 to 5.50
turnings, dry basis	3.50 to 4.00
Low copper, alloys 51, 52, 61, 63S solids	7.00 to 8.00
turnings, dry basis	5.00 to 6.50

Plant scrap, mixed

Solids	5.25
Turnings, dry basis	4.00

Obsolete scrap

Pure cable	8.00
Old sheet and utensils	7.50
Old castings and forgings	6.00
Pistons, free of struts	5.00
Pistons, with struts	4.50
Old alloy sheet	3.00 to 4.00

Magnesium*

Segregated plant scrap

Pure solids and all other solids, exempt	
Borings and turnings	1.50

Mixed, contaminated plant scrap

Grade 1 solids	3.00
Grade 1 borings and turnings	2.00
Grade 2 solids	2.00
Grade 2 borings and turnings	1.00

*Nominal.

Zinc

New zinc clippings, trimmings	6.50
Engravers, lithographers plates	6.50
Old zinc scrap	4.75
Unsweated zinc dross	5.00
Die cast slab	4.50
New die cast scrap	4.45
Radiator grilles, old and new	3.50
Old die cast scrap	3.00

Lead

Deduct 0.55¢ a lb from refined metal basing point prices or soft and hard lead including cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under ½%, 23¢ per lb; 90 to 98% Ni, 23¢ per lb contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb, f.o.b. shipping point in 500 lb lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer	25½
Electrodeposited	18⅞
Rolled, oval, straight	19⅝
Curved	20⅝
Brass, 80-20, frt allowed	
Cast, oval, 15 in. or longer	23⅝
Zinc, cast, 99.99, 15 in. or longer	16¼
Nickel, 99 pct plus, frt allowed	
Cast	47
Rolled, depolarized	48
Silver, 999 fine	
Rolled, 100 oz. lots, per oz.	80¾

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 1-5 bbls	34.00
Copper sulphate, 99.5, crystals, bbls	7.75
Nickel salts, single, 425 lb bbls, frt allowed	13.50
Silver cyanide, 100 oz lots, per oz.	0.655
Sodium cyanide, 96 pct, domestic, 100 lb drums	15.00
Zinc cyanide, 100 lb drums	33.00
Zinc sulphate, 89 pct, crystals, bbls, frt allowed	6.35

SCRAP

Strikes Cut Down Scrap Production

New York

• • • Continued pressure of the wage and price situation on the civilian production program is reflected in a complete standstill in the generation of industrial scrap and there is therefore an acute shortage of scrap in the market despite the limited requirements of a gradually declining ingot rate.

This condition is expected to prevail for some time, for the low steel rate itself will long exert a powerful influence on the scrap market. There are reports that some dealers are diverting some scrap steel supplies into the more lucrative surplus steel market and thus placing themselves in a position to withstand better the higher costs involved in fixed ceiling operations.

Cast scrap is reported to be all but unobtainable except in the East where dismantling operations are proceeding. There is, therefore, little possibility of mills' making use of larger proportions of cast scrap in the charging box to make up for the current severe shortage in pig iron. However, many mills are charging a larger proportion of steel scrap, adding graphite to the melt in order to bring up the carbon content. Reports from most mills indicate that their shortage of pig iron is acute and most mills have worked out plans to all but close down should the coal strike be continued at the end of the truce.

Wherever possible, yards are endeavoring to upgrade scrap in order to obtain the benefit of a higher ceiling price. Mills in some areas using low phos, therefore, find little difficulty in replenishing stockpiles of this material.

It is reported that dealers are in active competition in the purchase of unprepared scrap which tends to build up the price structure and cut down the margin of return for operating costs. Nevertheless, the question of a revision in the OPA ceilings for scrap seems to be dormant for the time being.

Mill inventories of scrap are at a low ebb according to their own reports, and this is likely to grow more significant when steel production begins at more normal higher levels. At that time shortages of scrap, pig iron and transportation facilities, combined, are likely to present the industry with an insoluble problem. Meanwhile, the country suffers from the need for finished steel products.

PITTSBURGH—The scrap situation in this area is pretty critical, but not quite as bad as in Chicago or the Mahoning Valley. The supply situation in the Valley has been described by one consumer as impossible. Shipments have fallen off, dealers offerings are low, and the demand is great. Many producers of scrap, especially automobile companies, are earmarking scrap for certain companies and mills, so that dealers have no choice on where it can be sold. Larger companies will not be too troubled by this but smaller ones will really be in trouble because of this practice if it is carried further. The coal strike has increased scrap demand because of the increase in cold metal charges. Foundries are in great need of scrap, especially cast and such specialties as rail crops and wheels.

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CHICAGO—Shipments to consumers still lag behind current rates of consumption, although the total tonnage of material moving is somewhat greater than might be indicated by operations of local industrial plants. Practically no limit is evoked by major consumers on the amount of springboard which they will pay, but remote sources do not provide any magic reservoir and consideraole digging is necessary to bring forth small tonnages. Yards still complain that lack of labor is a hampering factor and that tonnage could be increased with more manpower. Dealers buying prices have advanced to a point where the spread afforded has adversely affected the profit picture. Reports of scrap being withheld in hopes of a price advance cannot be confirmed.

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PHILADELPHIA — Eastern Pennsylvania mills report that scrap shipments are not coming in as fast as they would like, except users of low phos who are apparently getting all they need. Cast scrap is practically unobtainable, so that it is not possible to fill in the need for pig iron with this material. Some mills are stepping up their steel scrap proportion and adding graphite to bring up the carbon content. Mills feel that some scrap dealers may be diverting their activities to sale of salvageable steel products in the present market.

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DETROIT—The scrap shortage here continues with increased pressure being exerted on dealers to make deliveries to steel mills and foundries. Several dealers report buying pressure exceeds anything experienced here during the war. The sharp curtailment of automobile output has cut heavily into anticipated scrap generation. Other collections are also below normal. As much as 60 to 70 pct of production scrap is reported to be earmarked for the steel supplier and there are some indications that this practice may be extended to foundries. At the present time there are no indications that existing pressures will be relieved even though steel mills are forced to shut down because of a lack of coal or pig iron.

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BOSTON—Previous to, and since government took over the railroads, many yards have been on the sidelines. The risk of demurrage is too great, they say. On the other hand, cars have been plentiful and some of them have been started to points outside New England. Also, trucklots continue to move to foundries. One local foundry reports purchase of a car of heavy cast. However, all kinds of scrap are in limited supply. That of turnings and borings is well below the Jan. 1 level because many shops have dropped from 48 to 40 hr per week.

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NEW YORK—As in recent weeks the volume of scrap shipments from this area is down principally because there has been practically no production scrap generated during the strikes. Also, unprepared scrap is being shipped out of this area to consuming centers where the ceilings are higher, and since preparation expense and overhead are relatively high in this district, yards are not in a competitive position for successful bidding. Cast scrap supply is fair here, originating principally from dismantling operations.

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BUFFALO—Scrap is tighter than it ever was here and the supply appears to be dropping steadily according to industry reports. Some mills are taking low phos scrap in order to improve their supply. No mill is holding up scrap shipments despite the coal situation. One of the leading dealers here has expanded his operations to cover nonferrous scrap in order to continue in operation.

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ST. LOUIS—The coal strike and the threat of a railroad strike held down the shipment of scrap iron to St. Louis last week. Rainy weather also interfered with the collection and processing of material. Industrial scrap collections have been sharply cut as a result of the shortage of steel. Mills are eager to get material and are even reaching out to more remote areas at higher prices to replenish their stockpiles. The Pennsylvania has a list of approximately 13,000 tons, but it is not expected that much of it will come to this market. Prices are strong and unchanged.

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CLEVELAND—No change is evident in the scrap market here. Demand continues to exceed supply by a broader margin and, with furnaces operating on a high scrap charge, inventories are dwindling. Supplies in some consumers' plants are sufficiently short to prevent a high rate of operation in the event of adequate coal. If present conditions prevail, a gradual concentration of operations by major consumers will probably start to shape up within the next week or so.

Going prices as obtained in the trade by IRON AGE editors, based on representative tonnages. Where asterisks are used on quotations below, this indicates a ceiling price to which must be added brokerage fee and adjusted freight.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00*
RR. hvy. melting	21.00*
No. 2 hvy. melting	20.00*
RR. scrap rails	21.50*
Rails 3 ft. and under	23.50*
No. 1 comp'd sheets	20.00*
Hand bdld. new shts.	20.00*
Hvy. axle turn.	19.50*
Hvy. steel forge turn.	19.50*
Mach. shop turn.	15.00*
Short shov. turn.	17.00*
Mixed bor. and turn.	15.00*
Cast iron borings	16.00*
Hvy. break cast.	16.50*
No. 1 cupola	20.00*
RR. knuck. and coup.	24.50*
RR. coil springs	24.50*
Rail leaf springs	24.50*
Rolled steel wheels	24.50*
Low phos. bil. crops	25.00*
Low phos.	22.50*
RR. malleable	22.00*

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$18.75*
No. 2 hvy. melting	18.75*
No. 1 bundles	18.75*
No. 2 dealers' bndls.	18.75*
Bundled mach. shop turn.	18.75*
Galv. bundles	16.75*
Mach. shop turn.	13.75*
Short shovels, turn.	15.75*
Cast iron borings	14.75*
Mix. borings & turn.	13.75*
Low phos. hvy. forge	23.75*
Low phos. plates	21.25*
No. 1 RR. hvy. melt.	19.75*
Reroll rails	22.25*
Miscellaneous rails	20.25*
Angles & splice bars	22.25*
Locomotive tires, cut	24.25*
Cut bolsters & side frames	22.25*
Standard stl. car axles	25.75*
No. 3 steel wheels	23.25*
Couplers & knuckles	23.25*
Agricul. malleable	22.00*
RR. malleable	22.00*
No. 1 mach. cast.	20.00*
Rails 3 ft. and under	22.25*
No. 1 agricul. cast.	20.00*
Hvy. breakable cast.	16.50*
RR. grate bars	15.25*
Cast iron brake shoes	15.25*
Stove plate	19.00*
Clean auto cast.	20.00*
Cast iron carwheels	20.00*

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50*
No. 2 hvy. melting	19.50*
No. 1 bundles	19.50*
No. 2 bundles	19.50*
Mach. shop turn.	$10.50 to 11.00
Shoveling turn.	12.50 to 13.00
Cast iron borings	11.50 to 12.00
Mixed bor. & turn.	11.50 to 12.00
Low phos. plate	22.00*
No. 1 cupola cast.	20.00*
Hvy. breakable cast.	16.50*
Stove plate	19.00*
Scrap rails	21.00*

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars

No. 1 hvy. melting	$15.05*
No. 2 hvy. melting	15.05*
Nos. 1 and 2 bundles	15.05*
Busheling	15.05*
Turnings, shovelings	12.05*
Machine shop turn.	10.05*
Mixed bor. & turn.	10.05*
Cl'n cast, chem. bor.	$13.06 to 14.15*

Truck delivery to foundry

Machinery cast.	21.00 to 23.51*
Breakable cast.	21.57 to 21.87*
Stove plate	20.00 to 23.51*

DETROIT

Per gross ton, brokers' buying prices:

No. 1 hvy. melting	$17.32*
No. 2 hvy. melting	17.32*
No. 1 bundles	17.32*
New busheling	17.32*
Flashings	17.32*
Mach. shop turn.	12.32*
Short shov. turn.	14.32*
Cast iron borings	13.32*
Mixed bor. & turn.	12.32*
Low phos. plate	19.32*
No. 1 cupola cast.	20.00*
Charging box cast.	19.00*
Hvy. breakable cast.	16.50*
Stove plate	19.00*
Automotive cast.	20.00*

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$18.75*
No. 2 hvy. melting	18.75*
No. 2 bundles	18.75*
Mach. shop turn.	13.75*
Shoveling turn.	15.75*
Cast iron borings	14.75*
Mixed bor. & turn.	13.75*
No. 1 cupola cast.	20.00*
Hvy. breakable cast.	16.50*
Cast, charging box	19.00*
Hvy. axle forge turn.	18.25*
Low phos. plate	21.25*
Low phos. punchings	21.25*
Billet crops	21.25*
RR. steel wheels	23.25*
RR. coil springs	23.25*
RR. malleable	22.00*

ST. LOUIS

Per gross ton delivered to consumer:

Heavy melting	$17.50*
Bundled sheets	17.50*
Mach. shop turn.	12.50*
Locomotive tires, uncut.	$18.50 to 19.00
Misc. std. sec. rails	19.00*
Rerolling rails	21.00*
Steel angle bars	21.00*
Rails 3 ft and under	21.50*
RR. springs	22.00*
Steel car axles	24.50*
Stove plate	19.00*
Grate bars	15.25*
Brake shoes	15.25*
RR. malleable	22.00*
Cast iron carwheels	20.00*
No. 1 mach'ery cast	20.00*
Breakable cast.	16.50*

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$17.00*
No. 2 hvy. melting	17.00*
No. 2 bundles	17.00*
No. 1 busheling	17.00*
Long turnings	12.00*
Shoveling turnings	14.00*
Cast iron borings	13.00*
Bar crops and plate	$18.50 to 19.50*
Structural and plate	18.50 to 19.50*
No. 1 cast	20.00*
Stove plate	19.00*
Steel axles	18.50*
Scrap rails	18.50
Rerolling rails	20.50*
Angles & splice bars	20.50 to 21.00
Rails 3 ft. & under	21.00*
Cast iron carwheels	17.50 to 18.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00*
No. 2 hvy. melting	20.00*
Low phos. plate	22.50*
No. 1 busheling	20.00*
Hydraulic bundles	20.00*
Mach. shop turn.	15.00*
Short shovel. turn.	17.00*
Cast iron borings	16.00*

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$15.33*
No. 2 hvy. melting	15.33*
Comp. black bundles	15.33*
Comp. galv. bundles	13.33*
Mach. shop turn.	10.33*
Mixed bor. & turn.	10.33*
Shoveling turn.	12.33*
No. 1 cupola cast	20.00*
Hvy. breakable cast	16.50*
Charging box cast	19.00*
Store plate	19.00*
Clean auto cast	20.00*
Unstrip. motor blks.	17.50*
Cl'n chem. cast bor.	14.33*

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.25*
No. 1 bundles	19.25*
No. 2 bundles	19.25*
No. 2 hvy. melting	19.25*
Mach. shop turn.	14.25*
Shoveling turn.	16.25*
Cast iron borings	14.25*
Cast iron borings	15.25*
Mixed bor. & turn.	14.25*
Stove plate	19.00*
Low phos. plate	21.75*
Scrap rails	20.75*
Rails 3 ft. & under	22.75*
RR. steel wheels	23.75*
Cast iron car wheels	20.00*
RR. coil & leaf spgs.	23.75*
RR. knuckles & coup.	23.75*
RR. malleable	22.00*
No. 1 busheling	19.25*

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50*
No. 2 hvy. melting	19.50*
Compressed sheet stl.	19.50*
Drop forge flashings	19.00
No. 2 bundles	19.50*
Mach. shop turn.	14.50*
Short shovel.	16.50*
No. 1 busheling	19.50*
Steel axle turn.	19.00*
Low phos. billet and bloom crops	24.50*
Cast iron borings	15.50*
Mixed bor. & turn.	14.50*
No. 2 busheling	17.00*
No. 1 machine cast	20.00*
Railroad cast	20.00*
Railroad grate bars	15.25*
Stove plate	19.00*
RR. hvy. melting	20.50*
Rails 3 ft. & under	23.00*
Rails 18 in. & under	24.25*
Rails for rerolling	23.00*
Railroad malleable	22.00*
Elec. furnace punch	22.00*

SAN FRANCISCO

Per gross ton delivered to consumer:

RR. hvy. melting	$16.00 to $16.75
No. 1 hvy. melting	16.00 to 16.75
No. 2 hvy. melting	16.00 to 16.75
No. 2 bales	14.00 to 14.75
No. 3 bales	8.50 to 9.25
Mach. shop turn.	6.50 to 7.25
Elec. furn. 1 ft. und.	15.50 to 17.00
No. 1 cupola cast	19.00 to 21.00

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	$14.50 to $15.25
No. 2 hvy. melting	13.50 to 14.25
No. 1 bales	13.50 to 14.25
No. 2 bales	12.50 to 13.25
No. 3 bales	8.00 to 9.00
Mach. shop turn.	6.00
No. 1 cupola cast	19.00 to 21.00

SEATTLE

Per gross ton delivered to consumer:

RR. hvy. melting	$14.50*
No. 1 & No. 2 hvy. melting	14.50*
Elec. furn. 1 ft. und.	$14.00 to 15.00
No. 1 cupola cast	20.00*

HAMILTON, ONT.

Per gross ton delivered to consumer:

Heavy melting	$17.50*
No. 1 bundles	17.50*
No. 2 bundles	17.00*
Mixed steel scrap	15.50*
Rails, remelting	18.50*
Rails, rerolling	21.50*
Bushelings	13.00*
Mixed borings & turnings	12.50*
Electric furnace bundles	20.50*
Manganese steel scrap	20.00*
No. 1 cast	19.00*
Stove plate	17.50*
Car wheels, cast	19.50*
Malleable iron	16.00*

Comparison of Prices . .

Advances over past week in **Heavy Type**; declines in *Italics*. Prices are f.o.b. major basing points. The various basing points for finished and semifinished steel are listed in the detailed price tables.

Flat-Rolled Steel: (cents per pound)	May 21, 1946	May 14, 1946	Apr. 16, 1946	May 22, 1945
Hot-rolled sheets	2.425	2.425	2.425	2.20
Cold-rolled sheets	3.275	3.275	3.275	3.05
Galvanized sheets (24 ga.)	4.05	4.05	4.05	3.65
Hot-rolled strip				
6-in. and under	2.45	2.45	2.45	2.10
Over 6 in.	2.35	2.35	2.35	2.10
Cold-rolled strip	3.05	3.05	3.05	2.80
Plates	2.50	2.50	2.50	2.20
Plates, wrought iron	4.112	4.112	4.112	3.80
Stain's c-r strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terneplate: (dollars per base box)				
Tinplate, standard cokes	$5.25	$5.25	$5.25	$5.00
Tinplate, electro (0.50 lb)	4.75	4.75	4.75	4.50
Special coated mfg. ternes	4.55	4.55	4.55	4.30
Bars and Shapes: (cents per pound)				
Merchant bars	2.50	2.50	2.50	2.15
Cold-finished bars	3.10	3.10	3.10	2.65
Alloy bars	2.808	2.808	2.808	2.70
Structural shapes	2.35	2.35	2.35	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.76	4.76	4.76	4.40
Wire and Wire Products: (cents per pound)				
Bright wire	3.05	3.05	3.05	2.60
Wire nails	3.25	3.25	3.25	2.80
Rails: (dollars per net ton)				
Heavy rails	$43.39	$43.39	$43.39	$43.00
Light rails	49.18	49.18	49.18	43.00
Semifinished Steel: (dollars per gross ton)				
Rerolling billets	$39.00	$39.00	$39.00	$34.00
Sheet bars	38.00	38.00	38.00	34.00
Slabs, rerolling	39.00	39.00	39.00	34.00
Forging billets	47.00	47.00	47.00	40.00
Alloy blooms, billets, slabs	56.16	56.16	56.16	54.00
Wire Rods and Skelp: (cents per pound)				
Wire rods	2.30	2.30	2.30	2.00
Skelp	2.05	2.05	2.05	1.90

Pig Iron: (per gross ton)	May 21, 1946	May 14, 1946	Apr. 16, 1946	May 22, 1945
No. 2 foundry, Phila.	$28.34	$28.34	$28.34	$26.84
No. 2, Valley furnace	26.50	26.50	26.50	25.00
No. 2, Southern, Cin'ti	26.94	26.94	26.94	25.44
No. 2, Birmingham	22.88	22.88	22.88	21.38
No. 2 foundry, Chicago†	26.50	26.50	26.50	25.00
Basic, del'd eastern Pa.	27.84	27.84	27.84	26.34
Basic, Valley furnace	26.00	26.00	26.00	24.50
Malleable, Chicago†	26.50	26.50	26.50	25.00
Malleable, Valley	26.50	26.50	26.50	25.00
L. S. charcoal, Chicago	42.34	42.34	42.34	42.34
Ferromanganese‡	135.00	135.00	135.00	135.00

† The switching charge for delivery to foundries in the Chicago district is 60¢ per ton.
‡ For carlots at seaboard.

Scrap: (per gross ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.00
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.32	17.32	17.32	17.32
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Chicago	20.00	20.00	20.00	20.00
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$7.50	$7.50	$7.50	$7.00
Foundry coke, prompt	9.00	9.00	9.00	8.25
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00
Tin, Straits, New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	14.50	14.50	14.50	14.50

Composite Prices . .

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942 and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite prices for the current quarter are an estimate based on finished steel shipments for the previous quarter. These figures will be revised when the actual data of shipments for this quarter are compiled.

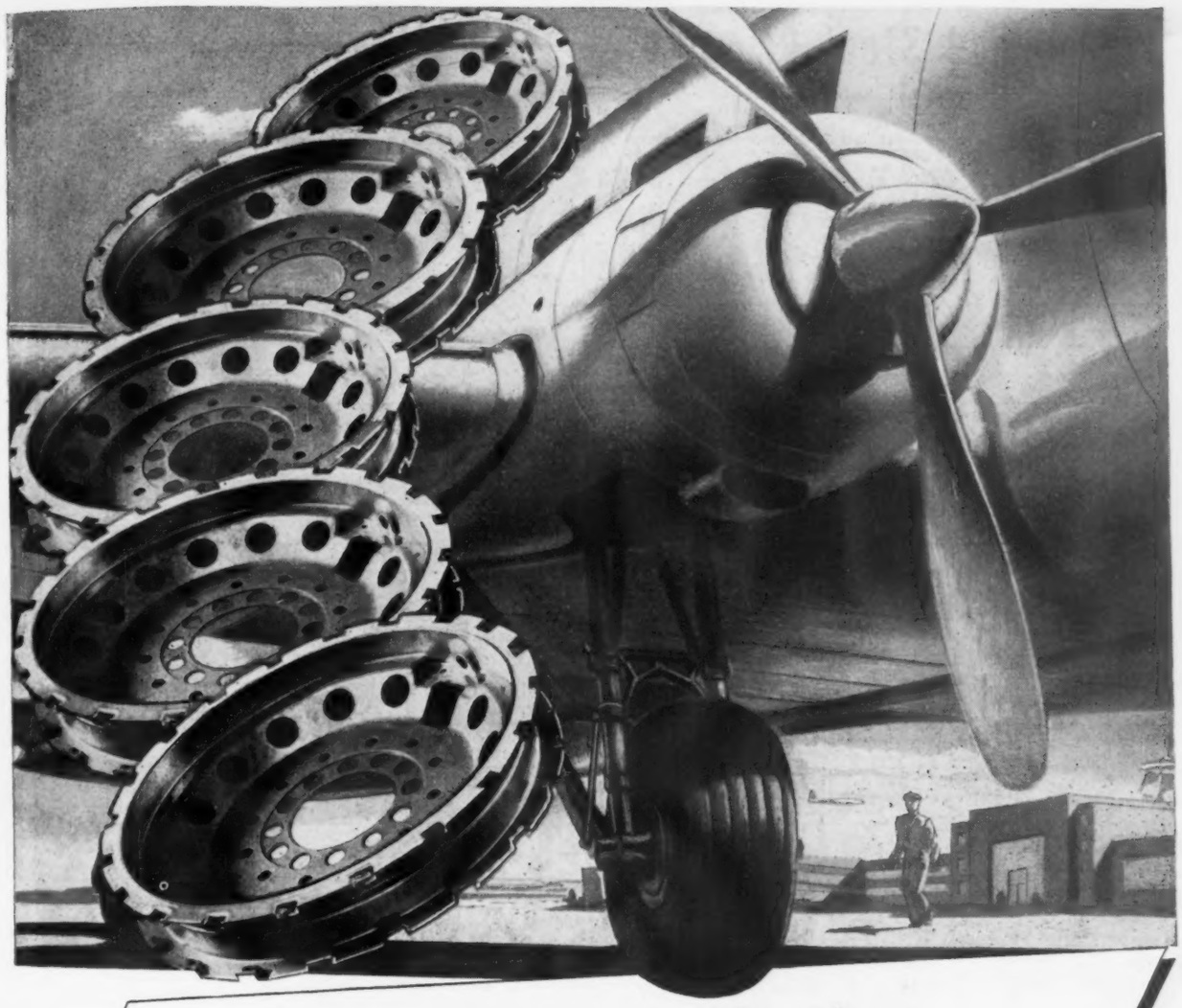
	FINISHED STEEL	PIG IRON	SCRAP STEEL
May 21, 1946	2.69516¢ per lb.	$26.12 per gross ton	$19.17 per gross ton
One week ago	2.69516¢ per lb.	$26.12 per gross ton	$19.17 per gross ton
One month ago	2.69516¢ per lb.	$26.12 per gross ton	$19.17 per gross ton
One year ago	2.42471¢ per lb.	$24.61 per gross ton	$18.92 per gross ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1946	2.69516¢ Feb. 19	2.44104¢ Jan. 1	$26.12 Mar. 19	$25.37 Jan. 1	$19.17	$19.17
1945	2.44104¢ Oct. 2	2.38444¢ Jan. 2	25.37 Oct. 23	23.61 Jan. 2	$19.17 Jan. 2	$18.92 May 22
1944	2.30837¢ Sept. 5	2.21189¢ Oct. 5	$23.61	$23.61	19.17 Jan. 11	15.76 Oct. 24
1943	2.29176¢	2.29176¢	23.61	23.61	$19.17	$19.17
1942	2.28249¢	2.28249¢	23.61	23.61	19.17	19.17
1941	2.43078¢	2.43078¢	$23.61 Mar. 20	$23.45 Jan. 2	$22.00 Jan. 7	$19.17 Apr. 10
1940	2.30467¢ Jan. 2	2.24107¢ Apr. 16	23.45 Dec. 23	22.61 Jan. 2	21.83 Dec. 30	16.04 Apr. 9
1939	2.35367¢ Jan. 3	2.26689¢ May 16	22.61 Sept. 19	20.61 Sept. 12	22.50 Oct. 3	14.08 May 16
1938	2.58414¢ Jan. 4	2.27207¢ Oct. 18	23.25 June 21	19.61 July 6	15.00 Nov. 22	11.00 June 7
1937	2.58414¢ Mar. 9	2.32263¢ Jan. 4	23.25 Mar. 9	20.25 Feb. 16	21.92 Mar. 30	12.67 June 9
1936	2.32263¢ Dec. 28	2.05200¢ Mar. 10	19.74 Nov. 24	18.73 Aug. 11	17.75 Dec. 21	12.67 June 8
1935	2.07642¢ Oct. 1	2.06492¢ Jan. 8	18.84 Nov. 5	17.83 May 14	13.42 Dec. 10	10.33 Apr. 29
1934	2.15367¢ Apr. 24	1.95757¢ Jan. 2	17.90 May 1	16.90 Jan. 27	13.00 Mar. 13	9.50 Sept. 25
1933	1.95578¢ Oct. 3	1.75836¢ May 2	16.90 Dec. 5	13.56 Jan. 3	12.25 Aug. 8	6.75 Jan. 3
1932	1.89196¢ July 5	1.83901¢ Mar. 1	14.81 Jan. 5	13.56 Dec. 6	8.50 Jan. 12	6.43 July 5
1931	1.99626¢ Jan. 13	1.86586¢ Dec. 29	15.90 Jan. 6	14.79 Dec. 15	11.33 Jan. 6	8.50 Dec. 29
1930	2.25488¢ Jan. 7	1.97319¢ Dec. 9	18.21 Jan. 7	15.90 Dec. 16	15.00 Feb. 18	11.25 Dec. 9
1929	2.31773¢ May 28	2.26498¢ Oct. 29	18.71 May 14	18.21 Dec. 17	17.58 Jan. 29	14.08 Dec. 3

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 pct of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo Valley and Birmingham.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.



Brake Wheels for Airplanes

MADE OF J&L OTISCOLOY STEEL

—*For Higher Strength Without Increased Weight*

Hundreds of thousands of the combination wheels and brakes shown above were made of J&L Otiscoloy sheets to provide extra strength in supporting weight of practically all big transports, bombers and cargo planes. The 40% higher yield strength of Otiscoloy made it particularly suitable for this job, especially as Otiscoloy has the formability necessary to mass produce this intricate part. Otiscoloy also has excellent weldability and resists corrosion and abrasion. Write for Otiscoloy booklet.

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH 30, PENNSYLVANIA

J&L STEEL

Iron and Steel Prices...

Steel prices shown here are f.o.b. basing points, in cents per pound or dollars per gross ton. Extras apply. Delivered prices do not reflect 3 pct tax on freight. (1) Mill run sheet, 10¢ per 100 lb under base; primes, 25¢ above base. (2) Unassorted commercial coating. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25¢ per 100 lb to fabricators. (8) Also shafting. For quantities of 20,000 lb to 39,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is not used. (11) Boxed. (12) This base price for annealed, bright finish wires, commercial spring wire. (13) Produced to dimensional tolerances in AISI Manual Sect. 6. (14) Billets only. (15) 9/32 in. to 47/64 in., 0.15¢ per lb higher. (16) Add 8.2 pct to base price and extras.

Basing Points	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	10 Pacific Ports, Cars	DELIVERED TO Detroit	New York	Philadelphia
INGOTS															
Carbon, rerolling	($33.00 f. o. b. mill)														
Carbon, forging	$38	$38	$38	$38	$38	$38	$38								
Alloy	$46.80	$46.80				$46.80	(Bethlehem, Massillon, Canton, Coatesville—$46.80)								
BILLETS, BLOOMS, SLABS															
Carbon, rerolling	$39	$39	$39	$39	$39	$39	(Provo—$50.20, Duluth—$41[14]) $39					$51[14]	$41		
Carbon, forging billets	$47	$47	$47	$47	$47	$47	(Provo—$58.20, Duluth—$49[14]) $47					$59[14]	$49		
Alloy	$56.16	$56.16				$56.16	(Bethlehem, Massillon, Canton—$56.16)						$61		
SHEET BARS	$38	$38		$38		$38	$38	$38	(Canton—$38)						
PIPE SKELP	2.05¢	2.05¢					2.05¢	2.05¢	(Coatesville—2.05¢)						
WIRE RODS [15]															
No. 5 to 9/32 in.	2.30¢	2.30¢		2.30¢	2.30¢	(Worcester—2.40¢)					2.55¢	2.80¢			
SHEETS															
Hot-rolled	2.425¢	2.425¢	2.425¢	2.425¢	2.425¢	2.425¢	2.425¢	2.425¢	2.525¢	2.425¢		2.975¢	2.525¢	2.685¢	2.595¢
Cold-rolled[1]	3.275¢	3.275¢	3.275¢	3.275¢		3.275¢	3.275¢		3.375¢	3.275¢		3.925¢	3.375¢	3.815¢	3.595¢
Galvanized (24 gage)	4.05¢	4.05¢	4.05¢		4.05¢	4.05¢	4.05¢	4.05¢	4.15¢	4.05¢		4.60¢		4.29¢	4.22¢
Enameling (20 gage)	3.80¢	3.80¢	3.80¢	3.80¢			3.80¢		3.90¢	3.80¢		4.45¢	3.90¢	4.16¢	4.12¢
Long terne [2]	4.05¢	4.05¢	4.05¢									4.80¢		4.41¢	4.37¢
STRIP															
Hot-rolled [3] 6 in. and under	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢		2.45¢			2.45¢		3.10¢	2.55¢	2.81¢	2.77¢
Hot-rolled [3] over 6 in.	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢		2.35¢			2.35¢		3.00¢	2.45¢	2.71¢	2.67¢
Cold-rolled [4]	3.05¢	3.15¢		3.05¢			3.05¢	(Worcester—3.25¢)					3.15¢	3.41¢	3.37¢
Cooperage stock	2.55¢	2.55¢			2.55¢		2.55¢							2.91¢	
Commodity cold-rolled	3.20¢	3.30¢		3.20¢			3.20¢	(Worcester—3.60¢)					3.30¢	3.56¢	
TINPLATE															
Standard cokes, base box	$5.25	$5.25	$5.25		$5.35			$5.35	$5.35					$5.604[11]	$5.53[11]
Electro, box 0.25 lb	$4.60	$4.60	$4.60					$4.70							
Electro, box 0.50 lb	$4.75	$4.75	$4.75					$4.85	$4.85						
Electro, box 0.75 lb	$4.90		$4.90					$5.00	$5.00						
BLACKPLATE															
29 gage [5]	3.30¢	3.30¢	3.30¢					3.40¢	3.40¢						3.57¢
TERNES, MFG.															
Special coated, base box	$4.55	$4.55	$4.55					$4.65	$4.65						
BARS								(Duluth—2.80¢)							
Carbon steel	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	(Provo, Utah—3.20¢)			2.85¢	3.15¢	2.60¢	2.84¢	2.82¢
Rail steel [6]	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢					2.85¢	3.15¢			
Reinforcing (billet) [7]	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢			2.70¢	2.75¢	2.45¢	2.59¢	2.67¢
Reinforcing (rail) [7]	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢	2.35¢				2.70¢	2.75¢	2.45¢		2.57¢
Cold-finished [8]	3.10¢	3.10¢	3.10¢	3.10¢		3.10¢		(Detroit—3.15¢)		(Toledo—3.25¢)				3.44¢	3.42¢
Alloy, hot-rolled	2.808¢	2.808¢				2.808¢	2.808¢	(Bethlehem Massillon, Canton—2.808¢)					2.908¢		
Alloy, cold-drawn	3.484¢	3.484¢	3.484¢	3.484¢		3.484¢							3.584¢		
PLATE								(Coatesville and Claymont—2.50¢, Provo, Utah—3.20¢)							
Carbon steel [13]	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢		2.50¢	2.50¢			2.85¢	3.05¢	2.72¢	2.69¢	2.55¢
Floor plates	3.75¢	3.75¢									4.10¢	4.40¢		4.11¢	4.07¢
Alloy	3.64¢	3.64¢			(Coatesville—3.64¢)						4.108¢	4.316¢		3.64¢	3.73¢
SHAPES															
Structural	2.35¢	2.35¢	2.35¢		2.35¢	2.35¢	(Bethlehem—2.35¢)				2.60¢	3.00¢		2.52¢	2.465¢
SPRING STEEL, C-R															
0.26 to 0.50 carbon	2.80¢			2.80¢			(Worcester—3.20¢)								
0.51 to 0.75 carbon	4.30¢			4.30¢			(Worcester—4.50¢)								
0.76 to 1.00 carbon	6.15¢			6.15¢			(Worcester—6.35¢)								
1.01 to 1.25 carbon	8.35¢			8.35¢			(Worcester—8.55¢)								
WIRE [9]															
Bright [12]	3.05¢	3.05¢		3.05¢	3.05¢		(Worcester—3.15¢)		(Duluth—3.10¢)			3.55¢			3.37¢
Galvanized	Add proper size extra and galvanizing extra to Bright Wire Base														
Spring (high carbon)	3.65¢	3.65¢		3.65¢			(Worcester—3.75¢)					4.15¢			3.97¢
PILING															
Steel sheet	2.65¢	2.65¢				2.65¢						3.20¢			2.97¢

CORROSION AND HEAT RESISTANT STEELS

In cents per pound, f.o.b. basing point

BASING POINT	Chromium Nickel		Straight Chromium			
	No. 304	No. 302	No. 410	No. 430	No. 442	No. 446
Ingot, P'gh, Chi, Canton, Balt, Reading, Ft. Wayne, Phila.	Subject to negotiation		Subject to negotiation			
Blooms, P'gh, Chi, Canton, Phila, Reading, Ft. Wayne, Balt.	22.99	24.67	17.01	17.47	20.69	25.29
Slabs, P'gh, Chi, Canton, Balt, Phila, Reading	22.99	24.67	17.01	17.47	20.69	25.29
Billets, P'gh, Chi, Canton, Newark, N. J., Watervliet, Syracuse, Balt.	Subject to negotiation		Subject to negotiation			
Billets, forging, P'gh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Watervliet, Syracuse, Newark, N. J., Ft. Wayne, Titusville	22.99	24.67	17.01	17.47	20.69	25.29
Bars, h-r, P'gh, Chi, Canton, Dunkirk, Watervliet, Newark, N. J., Syracuse, Balt, Phila, Reading, Ft. Wayne, Titusville	27.05	25.97	20.02	20.56	24.34	29.75
Bars, c-f, P'gh, Chi, Cleve, Canton, Dunkirk, Newark, N. J., Syracuse, Balt, Phila, Reading, Ft. Wayne, Watervliet	27.05	25.97	20.02	20.56	24.34	29.75
Plates, P'gh, Middletown, Canton	31.38	29.21	23.28	23.80	28.67	33.00
Shapes, structural, P'gh Chi	27.05	25.97	20.02	20.56	24.34	29.75
Sheets, P'gh, Chi, Middletown, Canton, Balt.	38.95	36.79	28.67	31.38	35.16	38.49
Strip, h-r, P'gh, Chi, Reading, Canton, Youngstown	25.43	23.28	18.39	18.93	25.97	37.87
Strip, c-r, P'gh, Cleve, Newark, N. J., Reading, Canton, Youngstown	32.46	30.30	23.80	24.34	34.62	56.26
Wire, c-d, Cleve, Dunkirk, Syracuse, Balt, Reading, Canton, P'gh, Newark, N. J., Phila.	27.05	25.97	20.02	20.56	24.34	29.75
Wire, flat, c-r, Cleve, Balt, Reading, Dunkirk, Canton	32.46	30.30	23.80	24.34	34.62	56.26
Rod, h-r, Newark, N. J., Syracuse	27.05	25.97	20.02	20.56	24.34	29.75
Tubing, seamless, P'gh, Chi, Canton, (4 in. to 6 in.)	72.09	72.09	.....	68.49	.....	.....

SHELL STEEL

	per gross ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic openhearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are $2.00 higher; East Michigan, $3 higher.

Prices Exceptions: Follansbee Steel Corp. permitted to sell at $13.00 per gross ton, f.o.b. Toronto, Ohio, above base price of $52.00.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

ELECTRICAL SHEETS

Base, all grades f.o.b. Pittsburgh

	per lb
Field grade	3.90¢
Armature	4.25¢
Electrical	4.75¢
Motor	5.425¢
Dynamo	6.125¢
Transformer 72	6.625¢
Transformer 65	7.625¢
Transformer 58	8.125¢
Transformer 52	8.925¢

F.o.b. Chicago and Gary, field grade through motor; f.o.b. Granite City, add 10¢ per 100 lb on field grade to and including dynamo. Pacific ports add 75¢ per 100 lb on all grades.

RAILS, TRACK SUPPLIES

(F.o.b. mill)

Standard rails, heavier than 60 lb	
No. 1 O.H., net ton	$43.39
Angle splice bars, 100 lb	2.85
(F.o.b. basing points)	*per net ton*
Light rails (from billets)	$49.18
Light rails (from rail steel)	48.29
	base per lb
Cut spikes	3.65¢
Screw spikes	5.55¢
Tie plate, steel	2.55¢
Tie plates, Pacific Coast	2.70¢
Track bolts	4.75¢
Track bolts, heat treated, to railroads	5.00¢
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25¢.

TOOL STEEL

*(F.o.b. Pittsburgh, Bethlehem, Syracuse, Dunkirk. *Also Canton, O.)*

An increase of 8.2 pct applies to base price and extras

	Base per lb
High speed	67¢
Straight molybdenum	54¢
Tungsten-molybdenum	57½¢
High-carbon-chromium*	43¢
Oil hardening*	24¢
Special carbon*	22¢
Extra carbon*	18¢
Regular carbon*	14¢

Warehouse prices on and east of Mississippi are 2¢ per lb higher; west of Mississippi 3¢ higher.

CLAD STEEL

Base prices, cents per pound

	Plate	Sheet
Stainless-clad		
No. 304, 20 pct, f.o.b. Pittsburgh, Washington, Pa.	18.72*	19.76
Nickel-clad		
10 pct, f.o.b. Coatesville, Pa.	18.72	....
Inconel-clad		
10 pct, f.o.b. Coatesville	26.00	....
Monel-clad		
10 pct, f.o.b. Coatesville	24.96	....
Aluminized steel		
Hot dip, 20 gage, f.o.b. Pittsburgh	....	9.00

*Includes annealing and pickling.

WIRE PRODUCTS

To the dealer, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Basing Points Named	*Pacific Coast Basing Points†*
	base per keg	
Standard wire nails	$3.25	$3.75
Coated nails	3.25	3.75
Cut nails, carloads	3.85	....
	base per 100 lb	
Annealed fence wire	$3.50	$4.00
Annealed galv. fence wire	3.85	4.35
	base column	
Woven wire fence*	72	90
Fence posts, carloads	74	91
Single loop bale ties††	72	97
Galvanized barbed wire**	79	89
Twisted barbless wire	79	89

*15½ gage and heavier. **On 80-rod spools in carload quantities.

†Prices subject to switching or transportation charges.

††Add 50c a ton.

ROOFING TERNEPLATE

(F.o.b. Pittsburgh, 112 sheets)

	20x14 in.	20x28 in.
8-lb coating I.C.	$8.50	$17.00
15-lb coating I.C.	9.50	19.00
20-lb coating I.C.	10.00	20.00

ALLOY EXTRAS

Alloy Steel	Basic Openhearth		Electric Furnace	
	Bars and Bar-strip	Billets, Blooms and Slabs	Bars and Bar-strip	Billets, Blooms and Slabs
NE 8600	0.675¢	$13.52	1.196¢	$23.92
NE 8700	0.728	14 56	1.248	24.96
NE 9400	C 780	15 60	1.300	26.00
NE 9700	0.676	13.52	1.196	23.92
NE 8800	1.352	27 04	1.872	37.44
NE 9900	1.248	24.96	1.612	32.24

The extras shown are in addition to the base price of $2.808 per 100 lb on finished products and $56.16 per gross ton on semifinished steel, major basing points, as shown in table, opposite page, and are in cents per pound when applicable to bars and bar-strip and in dollars per gross ton when applicable to billets, blooms and slabs. When acid openhearth is specified and acceptable, add to basic openhearth alloy differential 0.26¢ per lb for bars and bar-strip and $5.20 per gross ton for billets, blooms and slabs.

WELDED PIPE AND TUBING

Base discounts, f.o.b. Pittsburgh district and Lorain, Ohio, mills

(F.o.b. Pittsburgh only on wrought pipe) base price—$200.00 per net ton

Steel (buttweld)

	Black	Galv.
⅛-in.	60½	48
¼-in.	63½	52
1-in. to 3-in.	65½	54½

Wrought Iron (buttweld)

⅛-in.	18	+4
¼-in.	24	2½
1-in. and 1¼-in.	28½	9
1½-in.	33	12
2-in.	32	11

Steel (lapweld)

2-in.	58	46½
2½-in. and 3-in.	61	49½
3½-in. to 6-in.	63	51½

Wrought Iron (lapweld)

2-in.	25	4½
2½-in. to 3½-in.	26	7
4-in.	28	11
4½-in. to 8-in.	27	10

Steel (butt, extra strong, plain ends)

⅛-in.	58½	47½
¼-in.	62½	51½
1-in. to 3-in.	64	54

Wrought Iron (same as above)

⅛-in.	19	+1½
¼-in.	25	4½
1-in. to 2-in.	33	13

Steel (lap, extra strong, plain ends)

2-in.	56	45½
2½-in. and 3-in.	60	49½
3½-in. to 6-in.	63½	53

Wrought Iron (same as above)

2-in.	28	8½
2½-in. to 4-in.	34	16
4½-in. to 6-in.	32	14½

On buttweld and lapweld steel pipe jobbers are granted a discount of 5 pct. On l.c.l. shipments prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lapweld and one point lower discount, or $2 a ton higher on all buttweld.

BOILER TUBES

Seamless steel and lapweld commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft f.o.b. Pittsburgh, in carload lots

	Seamless Cold-Drawn	Seamless Hot-Rolled	Lapweld, Hot-Rolled
2 in. O.D. 13 B.W.G.	16.52	13.90	13.20
2½ in. O.D. 12 B.W.G.	22.21	18.70	17.87
3 in. O.D. 12 B.W.G.	24.71	20.79	19.56
3½ in. O.D. 11 B.W.G.	31.18	26.25	24.68
4 in. O.D. 10 B.W.G.	38.68	32.56	30.55

(Extras for less carload quantities)

40,000 lb or ft and over	Base
30,000 lb or ft to 39,999 lb or ft	5 pct
20,000 lb or ft to 29,999 lb or ft	10 pct
10,000 lb or ft to 19,999 lb or ft	20 pct
5,000 lb or ft to 9,999 lb or ft	30 pct
2,000 lb or ft or 4,999 lb or ft	45 pct
Under 2,000 lb or ft	65 pct

CAST IRON WATER PIPE

Per Net Ton

6-in. and larger, del'd Chicago	$60.80
6-in. and larger, del'd New York	60.20
6-in. and larger, Birmingham	52.00
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles or Seattle	74.00

For all rail shipment; rail and water shipment less.

Class "A" and gas pipe, $3 extra; 4-in. pipe is $5 a ton above 6-in.

BOLTS, NUTS, RIVETS, SET SCREWS

An increase of 7 pct applies to all listings.

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts

Base discount less case lots

Percent Off List

½ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1⅛ in. and larger, all lengths	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifin. Hexagon Nuts	U.S.S.	S.A.E.
Base discount less keg lots		
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 in. through 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full keg lots, 10 pct additional discount.

Stove Bolts

Consumer

Packages, nuts loose	71 and 10
In packages	71
In bulk	80

On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.

Large Rivets
(½ in. and larger)

Base per 100 Lb

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham $3.75

Small Rivets
(7/16 in. and smaller)

Percent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham ..... 65 and 5

Cap and Set Screws

	Percent Off List Consumer
Upset full fin, hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Fillister head cap, listed sizes	51

Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Div. certifies in writing the consumers need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF_2 Content:	Base price per short ton
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports**)

Per Gross Ton

Old range, bessemer, 51.50	$4.95
Old range, non-bessemer, 51.50	4.80
Mesaba, bessemer, 51.50	4.70
Mesaba, non-bessemer, 51.50	4.55
High phosphorus, 51.50	4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. F.o.b. shipping point, cents per lb, ton lots.

Brass, minus 100 mesh	18.5¢ to 20.25¢
Copper, electrolytic, 150 and 200 mesh	21½¢ to 23½¢
Copper, reduced, 150 and 200 mesh	20½¢ to 25½¢
Iron, commercial, 100, 200, 325, mesh 96 + % Fe	11¢ to 16¢
Iron, crushed, 200 mesh and finer, 90 + % Fe carload lots	4¢
Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe, drum lots	63¢
Iron, electrolytic, unannealed, 325 mesh and coarser, 99 + % Fe	27¢ to 42¢
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	31¢
Iron carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90¢
Aluminum, 100 and 200 mesh	*25¢
Antimony, 100 mesh	30¢
Cadmium, 100 mesh	$1.40
Chromium, 100 mesh and finer	$1.25
Lead, 100, 200 & 300 mesh	11½ to 15¢
Manganese, minus 325 mesh and coarser	44¢ to 61¢
Nickel, 150 mesh	51½¢
Silicon, minus 325 mesh and coarser	26¢ to 55¢
Solder powder, 100 mesh	8½¢ plus metal
Tin, 100 mesh	58¾¢
Tungsten metal powder, 98%-99%, any quantity, per lb	$2.60
Molybdenum powder, 99%, in 200-lb kegs, f.o.b. York, Pa., per lb	$2.60
Under 100 lb	$3.00

*Freight allowed east of Mississippi.

COKE

	Net Ton
Furnace, beehive (f.o.b. oven)	
Connellsville, Pa.	$7.50*
Foundry, beehive (f.o.b. oven)	
Fayette Co., W. Va.	8.10
Connellsville, Pa.	9.00
Foundry, Byproduct	
Chicago, del'd	13.75
Chicago, f.o.b.	13.00
New England, deld	14.65
Kearny, N. J., f.o.b.	13.05
Philadelphia, del'd	13.28
Buffalo, del'd	13.40
Portsmouth, Ohio, f.o.b.	11.50
Painesville, Ohio, f.o.b.	12.15
Erie, del'd	13.15
Cleveland, del'd	13.20
Cincinnati, del'd	13.25
St. Louis, del'd	13.75†
Birmingham, del'd	10.90

*Hand drawn ovens using trucked coal permitted to charge $8.60 per ton plus transportation charges.

†Except producers situated in states other than Missouri, Alabama or Tennessee, sellers may charge a maximum delivered price of $14.25 in the St. Louis Mo., and East St. Louis, Ill., switching districts.

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick*

Per 1000

Super-Duty brick, St. Louis	$76.05
First quality, Pa., Md., Ky., Mo., Ill.	60.40
First quality, New Jersey	65.90
Sec. quality, Pa., Md., Ky., Mo., Ill.	54.80
Sec. quality, New Jersey	57.70
No. 1 Ohio	50.00
Ground fire clay, net ton	8.95

Silica Brick*

Pennsylvania and Birmingham	$60.40
Chicago District	69.30
Silica cement, net ton (Eastern)	10.60

Chrome Brick

Per Net Ton

Standard chemically bonded, Balt., Plymouth Meeting, Chester $54.00

Magnesite Brick

Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$43.48
Domestic, f.o.b. Chewelah, Wash. in bulk	22.00
in sacks	26.00

*Retroactive to Apr. 1.

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendment to OPA Price Schedule 49.

Cities	SHEETS			STRIP			Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
				Hot-Rolled										
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	6 in. and Under	Over 6 in.	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 8742-50 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 8742-50 Ann.
**Philadelphia	$3.743	$5.097	$5.218a	$4.272	$4.172	$5.022	$3.855	$3.916	$4.072	$4.522	$6.016	$7.218	$7.372	$8.522
New York	3.815	4.838[3]	5.46	4.324	4.224	5.024	4.018	4.008	4.103	4.553	6.058	7.158	7.403	8.453
Boston	3.999	4.969[9]	5.674	4.456	4.356	4.965	4.162	4.162	4.294	4.594	6.212	7.312	7.444	8.494
Baltimore	3.619	5.077	5.344	4.252	4.152	....	3.844	4.009	4.052	4.502	....	....	....	....
Norfolk	3.996	....	5.821	4.515	4.415	....	4.221	4.252	4.315	4.615	....	....	....	....
Chicago	3.475	4.425	5.581	3.95	3.85	4.90[17]	3.80	3.80	3.75	4.20	....	....	....	....
Milwaukee	3.612	4.562[3]	5.537	4.087	4.077	5.037[17]	3.937	3.937	3.887	4.337	6.037	7.037	7.187	8.237
Cleveland	3.575	4.625	5.327	3.95	3.85	4.70[17]	3.65	3.838	3.60	4.20	6.008	....	6.95	....
Buffalo	3.575	4.625	5.104/5.20	4.169	4.069	4.919	3.88	3.65	3.60	4.20	5.80	6.90	7.95	8.00
Detroit	3.675	4.725	5.45	4.05	3.95	....	3.859	3.911	3.70	4.25	6.13	....	7.259	....
Cincinnati	3.65	4.70[3]	5.275	4.025	3.925	4.961	3.911	3.941	3.861	4.461	6.15	....	7.311	....
St. Louis	3.622	4.572[3]	5.581	4.097	3.997	5.181[17]	3.947	3.947	3.897	4.481	6.181	....	7.331	....
Pittsburgh	3.575	4.625	5.20	3.95	3.85	....	3.65	3.65	3.60	4.20	....	....	....	....
St. Paul	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Omaha	4.018	5.668	5.965	4.343	4.243	....	4.343	....	4.293	4.893	....	....	....	....
Indianapolis	3.745	4.795	5.37	4.12	4.02	4.99	3.88	3.88	3.83	4.43	6.13	....	7.28	....
Birmingham	3.675	....	5.20	....	....	....	3.80	3.80	3.75	4.903	....	....	....	....
Memphis	4.19	4.885	5.715	4.565	4.465	....	4.315	4.315	4.265	4.78	....	....	....	....
New Orleans	4.283*	5.304	5.808	4.658	4.558	....	4.408	4.408*	4.358*	5.079	....	....	....	....
Houston	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Los Angeles	4.70/5.00	6.80/7.20[3]	6.55	4.95	4.85	....	4.60/4.95	4.45/4.65	4.40/4.55	6.03/6.683	....	....	....	....
San Francisco	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Seattle	4.87[12]	7.27[4]	6.40	4.60	4.50	....	5.00[12]	4.70[12]	4.60[12]	6.23	....	....	....	....
Portland	4.87[11]	6.82[4]	6.20	5.10	5.00	....	5.00[11]	4.70[11]	4.70[11]	5.98	8.15	....	9.20	....
Salt Lake City	4.75	....	6.62[18]	5.88	....	....	5.23[18]	5.23[18]	5.13	6.35	....	....	....	....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED: Sheets, 400 to 1499 lb; strip, extras on all quantities; bars, 1500 lb base.

NE ALLOY BARS: 1000 to 39,999 lb.

GALVANIZED SHEETS: 450 to 1499 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 199 lb. (7) 400 to 1499 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 lb and over. (15) 1000 lb and over. (16) 1500 lb and over. (17) 2000 lb and over. (18) 3500 lb and over.

(a) Philadelphia: Galvanized sheet, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

* Add 0.271¢ for sizes not rolled in Birmingham.

** City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

PIG IRON PRICES

Maximum per gross ton, effective Mar. 15, 1946.
Prices do not reflect 3 pct tax on freight.

BASING POINT PRICES

Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	27.00	27.50	28.00	28.50	....
Birdsboro	27.00	27.50	28.00	28.50	32.00
Birmingham	21.50	22.88	....	27.50	....
Buffalo	25.50	26.50	27.00	27.50	32.00
Chicago	26.00	26.50	26.50	27.00	.....
Cleveland	26.00	26.50	26.50	27.00	.....
Detroit	26.00	26.50	26.50	27.00	.....
Duluth	26.50	27.00	27.00	27.50	.....
Erie	26.00	26.50	27.00	27.50	.....
Everett	27.00	27.50	28.00	28.50	.....
Granite City	26.00	26.50	26.50	27.00	.....
Hamilton	26.00	26.50	26.50	....	.....
Neville Island	26.00	26.50	26.50	27.00	.....
Provo	24.00	24.50	....	....	.....
Sharpsville[1]	26.00	26.00	26.50	27.00	.....
Sparrows Point	27.00	27.50	.....	.....	.....
Steelton	27.00	....	....	....	32.00
Swedeland	27.00	27.50	28.00	28.50	.....
Toledo	26.00	26.50	26.50	27.00	.....
Youngstown	26.00	26.50	26.50	27.00	.....

DELIVERED PRICES (BASE GRADES)

Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Boston	Everett	0.50	27.50	28.00	28.50	29.00	....
Boston	Birdsboro-Steelton	4.02	....	....	....	....	38.02
Brooklyn	Bethlehem	2.50	29.50	30.00	30.50	31.00	....
Brooklyn	Birdsboro	2.92	....	....	....	....	34.92
Canton	Clev, Ygstn, Sharpsvil.	1.39	27.39	27.89	27.89	28.39	....
Canton	Buffalo	3.19	....	....	....	....	35.10
Cincinnati	Birmingham	4.06	25.56	26.94	....	....	....
Cincinnati	Hamilton	1.11	....	....	27.61	....	....
Cincinnati	Buffalo	4.40	....	....	....	....	36.40
Jersey City	Bethlehem	1.53	28.53	29.03	29.53	30.03	....
Jersey City	Birdsboro	1.94	....	....	....	....	33.94
Los Angeles	Provo	4.95	28.95	29.45	.....	.....	....
Los Angeles	Buffalo	15.41	....	....	....	....	47.41
Mansfield	Cleveland-Toledo	1.94	27.94	28.44	28.44	28.94	....
Mansfield	Buffalo	3.36	....	....	....	....	35.36
Philadelphia	Swedeland	0.84	27.84	28.34	28.84	29.34	....
Philadelphia	Birdsboro	1.24	....	....	....	....	33.24
San Francisco	Provo	4.95	28.95	29.45	.....	.....	....
San Francisco	Buffalo	15.41	....	....	....	....	47.41
Seattle	Provo	4.95	28.95	29.45	.....	.....	....
Seattle	Buffalo	15.41	....	....	....	....	47.41
St. Louis	Granite City	0.50	26.50	27.00	27.00	27.50	....
St. Louis	Buffalo	7.07	....	....	....	....	39.07

(1) Struthers Iron & Steel Co., Struthers, Ohio, may charge 50¢ per ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

Charcoal pig iron base prices for Lyles, Tenn., and Lake Superior furnaces, $33.00 and $34.00, respectively. Newberry Brand of Lake Superior charcoal iron $39.00 per g.t., f.o.b. furnace, by order L 39 to RPS 10. Apr. 11, 1945, retroactive to Mar. 7, 1945. Delivered to Chicago, $42.34. High phosphorus iron sells at Lyles, Tenn., at $28.50.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); phosphorus differentials, a reduction of 38¢ per ton for phosphorous content of 0.70 pct and over; manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. Effective Mar. 3, 1948, $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron and bessemer ferrosilicon up to and including 14.00 pct silicon covered by RPS 10 as amended. Silvery iron, silicon 6.00 to 6.50 pct, C/L per g.t., f.o.b. Jackson, Ohio—$32.00; f.o.b. Buffalo—$33.25. Add $1.00 per ton for each additional 0.50 pct Si. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for prices of comparable analysis.

Ferromanganese

78-82% Mn, maximum contract base price, gross ton, lump size, f.o.b. Baltimore, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Less ton lots (packed)	148.50
F.o.b. Pittsburgh	139.50

$1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Briquets—per pound of briquet, freight allowed, 66% contained Mn.

	Eastern	Central	Western
Carload, bulk	6.05¢	6.30¢	6.60¢
Ton lots	6.65¢	7.55¢	8.55¢
Less ton lots	6.80¢	7.80¢	8.80¢

Spiegeleisen

Contract prices, gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$35.00	$36.00
Less ton	47.50	48.50
F.o.b. Pittsburgh, Chicago	40.00	

Manganese Metal

Contract basis, lump size, per pound of metal, f.o.b. shipping point, freight allowed.

96-98% Mn, 0.2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	30¢
L.c.l. lots	32¢

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	32¢
Ton lots	34¢
Less ton lots	36¢

Low-Carbon Ferromanganese

Contract price per pound Mn contained, lump size, f.o.b. shipping point, freight allowed, eastern zone.

	Carloads	Ton	Less
0.10 max. C, 0.06% P, 90% Mn	21.00¢	21.40¢	21.65¢
0.10% max. C	20.50¢	20.90¢	21.15¢
0.15% max. C	20.00¢	20.40¢	20.65¢
0.30% max. C	19.50¢	19.90¢	20.15¢
0.50% max. C	19.00¢	19.40¢	19.65¢
0.75% max. C, 7.00% max. Si	16.00¢	16.40¢	16.65¢

Silicomanganese

Contract basis, lump size, per pound of metal, f.o.b. shipping point, freight allowed. 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.05¢
Ton lots	6.70¢
Briquet, contract basis, carlots, bulk, freight allowed, per lb of briquet	5.80¢
Ton lots	6.30¢
Less ton lots	6.55¢

Silvery Iron (electric furnace)

Si 14.01 to 14.50%, $48.75 f.o.b. Keokuk, Iowa; $46.75 f.o.b. Niagara Falls. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 per ton for low impurities, not to exceed: P—0.05%, S—0.04%, C—1.00%. Covered by MPR 405.

Silicon Metal

Contract price per pound contained Si, lump size, f.o.b. shipping point, freight allowed, for ton lots, packed.

	Eastern	Central	Western
96% Si, 2% Fe	13.10¢	13.55¢	16.50¢
97% Si, 1% Fe	13.45¢	13.90¢	16.86¢

Ferrosilicon Briquets

Contract price per pound of briquet, bulk, f.o.b. shipping point, freight allowed to destination. 40% Si.

	Eastern	Central	Western
Carload, bulk	3.35¢	3.50¢	3.65¢
Ton lots	3.80¢	4.20¢	4.25¢

Electric Ferrosilicon

Contract price per pound contained Si, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
50% Si	6.65¢	7.10¢	7.25¢
75% Si	8.05¢	8.20¢	8.75¢
80-90% Si	8.90¢	9.05¢	9.55¢
90-95% Si	11.05¢	11.20¢	11.65¢

Ferrochrome (65-72% *Cr*, 2% *max. Si*)

Contract prices per pound, contained Cr, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
0.06% C	23.00¢	23.40¢	24.00¢
0.10% C	22.50¢	22.90¢	23.50¢
0.15% C	22.00¢	22.40¢	23.00¢
0.20% C	21.50¢	21.90¢	22.50¢
0.50% C	21.00¢	21.40¢	22.00¢
1.00% C	20.50¢	20.90¢	21.50¢
2.00% C	19.50¢	19.90¢	20.50¢
66-71% Cr, 4-10% C	13.00¢	13.40¢	14.00¢
62-66% Cr, 5-7% C	13.50¢	13.90¢	14.50¢

Briquets—contract price per pound of briquet, f.o.b. shipping point, freight allowed. 60% chromium.

	Eastern	Central	Western
Carload, bulk	8.25¢	8.55¢	8.95¢
Ton lots	8.75¢	9.25¢	10.75¢
Less ton lots	9.00¢	9.50¢	11.00¢

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low-carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N. High-carbon type: 66.71% Cr, 4-5% C, 0.75% N. Add 5¢ per lb to regular high-carbon ferrochrome price schedule.

S. M. Ferrochrome

Contract price per pound chromium contained, lump size, f.o.b. shipping point, freight allowed.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

	Eastern	Central	Western
Carload	14.00	14.40	15.00
Ton lots	14.00	15.55	16.75
Less ton lots	15.40	16.05	17.25

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.

	Eastern	Central	Western
Carload	20.00	20.40	21.00
Ton lots	21.00	21.65	22.85
Less ton lots	22.00	22.65	23.85

Chromium Metal

Contract prices per pound, chromium contained, carload, f.o.b. shipping point, freight allowed. 97% min. Cr, 1% max. Fe.

	Eastern	Central	Western
0.20% max. C	83.50	85.00	86.25
0.50% max. C	79.50	81.00	82.25
9.00% min. C	79.50	81.00	82.25

Chromium—Copper

Contract price per pound of alloy, f.o.b. Niagara Falls, freight allowed east of the Mississippi. 8-11% Cr, 88-90% Cu, 1.00% max. Fe, 0.50% max. Si.

Shot or ingot	45¢

Calcium—Silicon

Contract price per lb of alloy, lump, f.o.b. shipping point, freight allowed.

30-35% Ca, 60-65% Si, 3.00% max. Fe or 28-32% Ca, 60-65% Si, 6.00% max. Fe.

	Eastern	Central	Western
Carloads	13.00	13.50	15.55
Ton lots	14.50	15.25	17.40
Less ton lots	15.50	16.25	18.40

Calcium—Manganese—Silicon

Contract prices per pound of alloy, lump, f.o.b. shipping point, freight allowed.

16-20% Ca, 14-18% Mn, 53-59% Si.

	Eastern	Central	Western
Carloads	15.50¢	16.00¢	18.05¢
Ton lots	16.50¢	17.35¢	19.10¢
Less ton lots	17.00¢	17.85¢	19.60¢

Calcium Metal

Eastern zone contract prices per pound of metal, f.o.b. shipping point, freight allowed. Add 1¢ for central zone; 5¢ for western zone.

	Cast	Turnings	Distilled
Ton lots	$1.35	$1.75	$4.25
Less ton lots	1.60	2.00	5.00

CMSZ

Contract price per pound of alloy, f.o.b. shipping point, freight allowed.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.

	Eastern	Central	Western
Ton lots	12.00¢	12.75¢	14.75¢
Less ton lots	12.50¢	13.25¢	15.25¢

Alloy 5: 50-56% Cr, 4-6% Mn, 13-50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.

	Eastern	Central	Western
Ton lots	11.75¢	12.50¢	14.50¢
Less ton lots	12.25¢	13.00¢	15.00¢

SMZ

Contract price per pound of alloy, f.o.b. shipping point, freight allowed. 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe.

	Eastern	Central	Western
Ton lots	12.00¢	12.85¢	14.60¢
Less ton lots	12.50¢	13.35¢	15.10¢

Other Ferroalloys

Ferrotungsten, standard, lump or ¼X down, packed, f.o.b. plant Niagara Falls, Washington, Pa., York, Pa., per pound contained T, 5 ton lots, freight allowed	$1.88
Ferrovanadium, 35-55%, contract basis, f.o.b. plant, freight allowances, per pound contained V.	
Openhearth	$2.70
Crucible	$2.80
High speed steel (Primos)	$2.90
Vanadium pentoxide, 88-92% V_2O_5 technical grade, contract basis, per pound contained V_2O_5	$1.10
Ferrocolumbium, 50-60%, contract basis, f.o.b. plant, freight allowed, per pound contained Cb.	
Ton lots	$2.25
Less ton lots	$2.30
Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo	95¢
Calcium molybdate, 40-45¢, f.o.b. Langeloth, Washington, Pa., per pound contained Mo	80¢
Molybdenum oxide briquets, 48-52% Mo, f.o.b. Langeloth, Pa., per pound contained Mo	80¢
Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per pound contained Mo	80¢
Ferrotitanium, 40-45%, 0.10%C max., f.o.b. Niagara Falls, N. Y., ton lots, per pound contained Ti	$1.23
Less ton lots	$1.25
Ferrotitanium, 20-25%, 0.10%C max., ton lots, per pound contained Ti	$1.35
Less ton lots	$1.40
High-carbon ferrotitanium, 15-20%, 6-8% C, contract basis, f.o.b. Niagara Falls, freight allowed, carloads	$142.50
Ferrophosphorus, 18%, electric or blast furnaces, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equalled with Rockdale, Tenn., per gross ton	$58.50
Ferrophosphorus, Electrolytic, 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton	$75.00
Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.	
Carloads lots	14¢
Zirconium, 12-15%, contract basis, lump, f.o.b. plant, freight allowed, per pound of alloy	
Carload, bulk	4.60¢
Alsifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Niagara Falls, carload	5.75¢
Ton lots	7.25¢
Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound	
Car lots	8.00¢
Ton lots	8.75¢
Less ton lots	9.25¢

Boron Agents

Contract prices per pound of alloy, f.o.b. shipping point, freight allowed. Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

	Eastern	Central	Western
Less ton lots	$1.30	$1.3075	$1.329

Manganese—Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.

Ton lots	$1.89	$1.903	$1.935
Less ton lots	2.01	2.023	2.055

Nickel—Boron 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

Less ton lots	$2.10	$2.1125	$2.1445

Silcaz No. 3, contract basis, f.o.b. plant, freight allowed, per pound of alloy.

Carload lots	25¢
Ton lots	26¢

Silvaz No. 3, contract basis, f.o.b. plant, freight allowed, per pound of alloy.

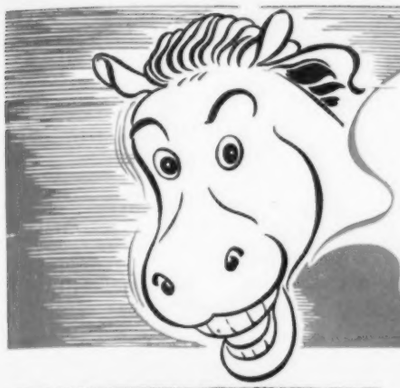
Carload lots	58¢
Ton lots	59¢

Grainal, f.o.b. Bridgeville, Pa., freight allowed, 50 lb and over.

No. 1	87.5¢
No. 6	60¢
No. 79	45¢

Bortram, f.o.b. Niagara Falls

Ton lots, per pound	45¢
Less ton lots, per pound	50¢



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1 In 1855, the first lake shipment of ore reached Cleveland from the iron ranges of Lake Superior. Unloading the cargo of even a small sailing vessel meant four or five days of unremitting toil. The ore had to be carried piggy-back from ship to shore!

2 In the early 1860's, unloading time was cut in half. Men down in the hold shoveled ore into tubs. Teams of horses on the docks pulled up the tubs. With as many as 40 horses, unloading a brig like the 132-ton Columbia, above, required several days.

3 In 1899, electrically operated Hulett unloaders made handling easier, quicker, cheaper. **Today,** Huletts empty a 14,275-ton cargo in less than 3 hours. Howell has specialized in motors for material handling and other industrial needs since 1915.

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Howell Motors are better than ever today. The reasons: Years of experience in building industrial type motors to meet the exacting requirements of the automotive, machine tool, dairy, food, and other important industries.

Howell Motors are quality-motors. They are smooth-operating because they are statically and dynamically balanced. They are better performing because they are built of the finest materials—copper or bronze rotors—and completely insulated. They are trouble-free on the job because they are designed for the toughest tasks in industry—consequently, they perform better on all jobs.

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**Another historic story by Old Reliable Red Band*

Howell Protected Type Motors available in sizes 5 h.p. and smaller. Also other sizes of Howell industrial type motors available up to 150 h.p.

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HOWELL ELECTRIC MOTORS CO., HOWELL, MICH.

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Write for complete information on the Stanley Unishear line. Stanley Electric Tools, New Britain, Connecticut.

STANLEY

STANLEY UNISHEAR

British Federation Modernization Plan

(CONTINUED FROM PAGE 125)

ernization plans have been drawn up.

EXPORTS: In the case of tinplates export trade will certainly be lost to Britain on quality grounds if wide strip mill production is not rapidly developed further. This the plan aims to do by placing as the most urgent of the major plans the building of a third large capacity hot strip mill and the necessary cold reduction tinplate mills.

There are already two wide strip mills in operation in Britain. The first was installed at Ebbw Vale; it was just coming into production in 1938 and had hardly begun to contribute to export. The second mill was installed by John Summers & Sons at Shotton and came into production at the beginning of the war.

Thus a sounder export basis for the tinplate and sheet trades than existed before the war is already available. When the third mill is completed the export position will be further improved and the total wide strip mill capacity of the country will be about 2,240,000 tons.

The present proposals involve an extension of steel ingot capacity for tube-making of about 336,000 tons, and in addition the expenditure of over $8,000,000 on tube-making plants. Major contracts have been secured and the construction work on the plant extensions is already proceeding.

The broad flange beam mill on the Northeast Coast will be of particular value in securing exports of structural steel and fabricated work for bridges and buildings.

The detailed developments in the various lighter finishing industries are difficult to analyze in relation to the export trade. Although prior to the war the steel tonnage exported was at a lower level than in 1913 or the 1920's, the proportion of high valued steel products had increased from about 20 pct of the total in 1913 to some 40 pct by 1937. This trend is likely to be maintained in the future.

FUEL CONSUMPTION: All considerations for fuel conservation have been taken into account in formulating the plan. Physical limits are set on the availability of scrap and cost considerations limit the

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No one can predict when interplanetary travel will become a reality, but today's amazing developments in radar, jet propulsion, and atomic power may shorten the actual time to years instead of centuries. Already stratosphere ships for inter-continent travel are in the planning stage.

The "skin" for tomorrow's space ship will have to be tough, strong, alloy, capable of withstanding both the extreme cold of outer spaces and the high temperatures developed when the ship enters our atmosphere at terrifically high speeds. Chances are it will be a special type of stainless steel, tailor-made to meet these exacting specifications . . . possibly a steel developed in the JESSOP Research Laboratories, where tomorrow's problems are being solved today.

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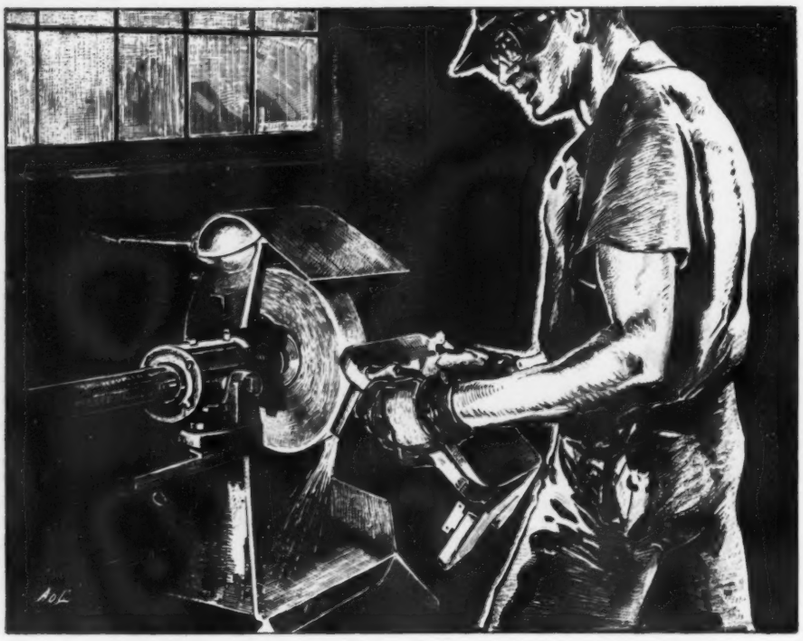

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use of the higher grade imported ores. Ore preparation plans are to be extended at Corby, Appleby-Frodingham and Normanby Park. They are also included in the plans for the new Northamptonshire, South Wales, Clyde, Dorman Long and Shotton plants.

Fuel consumption also will be reduced by the use of larger and more efficient blast furnaces. The new furnaces taken in conjunction with ore preparation will have a coke consumption using imported ore of 0.8 tons per ton of iron and using home ore 1.12 tons, or an average for the new furnaces of just over 0.95 tons which is equivalent to 1.45 tons of coal.

The average consumption at the old furnaces which will be displaced by the new furnaces is about 1.34 tons of coke or 2 tons of coal. The saving in coal consumption will therefore be 0.56 tons of coal per ton of pig iron in the new furnaces compared with the old furnaces.

With the new plants in operation it is estimated that the overall consumption of coal will be reduced from 1.84 tons in 1937, to 1.5 tons per ton of pig iron. As a result of this economy it will be possible to make 2,240,000 tons more pig iron than before the war, an increase of almost 30 pct, with an increase in consumption of coal of only 560,000 tons or about 5 pct.

Table VI summarizes the progressive reduction in fuel consumption in blast furnaces since 1913.

SIZE OF UNITS: The average annual output of the blast furnaces to be built will be about 224,000 tons a year—ranging from 280,000 tons on imported ore to 168,000 tons on the lower grade home ores—compared with 64,000 tons in the case of the furnaces displaced. This should increase the average output from all the basic pig iron furnaces in the country to at least 179,000 tons a yr, as shown in table VII.

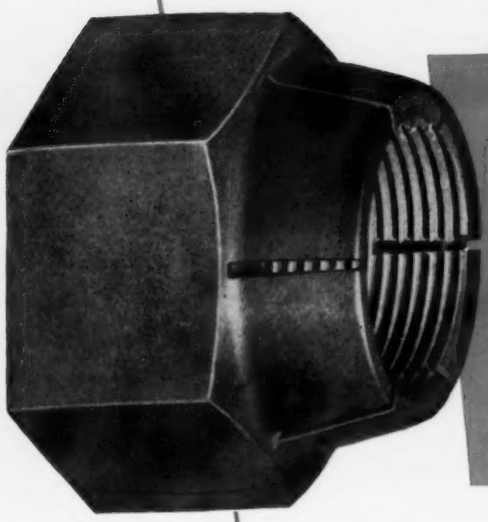
Average Basic Pig Iron Output per Furnace

	Net Tons
1920	39,000
1929	66,000
1939	100,000
1950 (estimated)	179,000

The steel melting plants proposed have an output of between 672,000 and 896,000 tons a yr. In a few cases a start will be made with 448,000 tons and there is one cold metal plant of 280,000 tons which will be an efficient unit based primarily on scrap.

TIMING OF CONSTRUCTION:

VIBRATION-PROOF... SHOCK-PROOF!



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Check these advantages against any other lock nut

1 One-piece construction—reduces assembly time and avoids possible failure to install supplemental locking medium.

2 Self-locking action—the Huglock Nut grips the bolt threads and maintains locking effect, whether seated or not, on the load-carrying flanks of the threads.

3 Axial thread play eliminated—Huglock Nuts are vibration-proof and shock-proof.

4 Thread load is distributed over all the threads of the nut, instead of being concentrated on the few bottom threads.

5 Maximum thread shear strength—full strength of the most modern 180,000 lb. tensile alloy bolt will not strip threads in nut. (Compare this with other designs.)

6 All metal construction permits applications involving high temperatures, oil or other types of moisture. Self-locking is maintained at high temperatures.

7 Easily installed—Huglocks start freely and may be tightened rapidly by standard hand or speed wrenches.

8 Economical to use—cotter pins, lock washers, key plates, jam nuts or other secondary locking devices are completely eliminated.

9 Re-usable—repeated removal and re-use on the same bolt or a similar bolt will not destroy the locking action.

10 Controlled preset torque values are built into Huglocks, insuring the vibration-proof results visioned in your engineering designs.

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Send for samples and consult with us on *any* fastener question.

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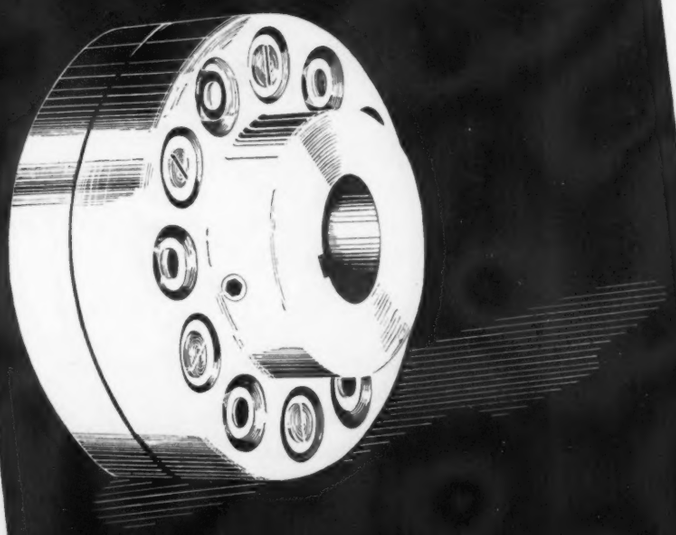

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AJAX FLEXIBLE COUPLING CO. INC.
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The large scale of the modernization plan makes it necessary to plan carefully the order of erection in order to insure that the most urgent items in the plan are dealt with first, that there is the minimum of interference with existing production during the building period, and that the major items are reasonably spaced in relation to machinery making capacity.

The following three considerations have been in mind in determining the order in which the development should be undertaken.

(1) Priority has been given to plans which secure the maximum early increase in production and efficiency with the minimum of capital expenditure. These are all plans which are likely to give the quickest results for the expenditure incurred. The developments under this head are mainly extensions at existing plants. For example, the additional blast furnace at the Clyde Iron Works. Similar cases of balancing up plans where quick benefit will be realized are the new open hearth furnaces based on works scrap at Corby and additions to the mills at Shotton to balance the hot strip mill output.

Another class of case that falls under this heading is where modernization is undertaken at a works which may not necessarily be producing under the ultimate long-term plan, or which may require in due course to be pulled down and completely reconstructed. Nevertheless, the works may have a useful life for a period of, say, from seven to ten yr, and it may well be worth while incurring limited expenditure to increase in the meantime the output or efficiency of such a plant.

In these cases the expenditure would not be worth undertaking unless it were incurred quickly. If, however, this is done, it may well represent a very economical way of securing a substantial cost reduction and assist in carrying the industry as a whole over a period in which output will be curtailed.

(2) Another priority consideration is to insure the development of major plans which give

Them's Strong Words, Mr. S.!

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MINNEAPOLIS, MINNESOTA

January 27, 1946

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I was pleased very much with the attention and service that you have given me since the purchase of this welder, and to reciprocate allow me to offer my time and welder to any prospective purchaser in this section of the country who is at all doubtful when you say, "It's the finest welder ever made."

With many wishes for your continued success, I am

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During the war years Alvey-Ferguson pioneered many distinct innovations in cleaning equipment. These can help you now. Learn how A-F *completely coordinated* Conveying and Cleaning Equipment will solve your problems and save time and money in the operation of your plant. Write, without obligation, today.

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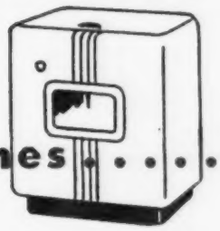
not only an increase in efficiency of production, but supply new and improved products or meet urgent national needs. An outstanding case is the new strip mill in South Wales. The new beam mill on the Northeast Coast falls into the same class. The plant will make a substantial contribution to the export trade in high-class structural work as well as being of general benefit to industrial construction in this country.

(3) Other considerations which have affected the program include the need to rebuild quickly in those cases where the saving is greatest in relation to the capital expenditure involved. At the same time it is important to interfere as little as possible with existing production which may, in any case, be inadequate to meet the full home demand without import during the modernization period.

This problem of securing maximum output in the interim period would be assisted if the continuous weekend working of steel plants, where practicable, were arranged. Something over 566,000 tons, and possibly 840,000 tons, additional capacity might be obtained in this way. A change in practice on the steel side—in blast furnaces continuous working operates at present—would present many problems, but is being given serious consideration in cooperation with the trade unions concerned, who, as in other matters, will give full help in working any plan which could be shown to be beneficial. A development of this type would not affect the long-term plans outlined here in their main essentials as the building program in each case could be adjusted.

These various considerations on timing appear to make it preferable to build the new billet plant in Lincolnshire before either the plant in Lancashire or Northamptonshire. The cost saving by replacing the Lysaght plant will be considerably greater than at Lancashire Steel; the plant can be built without more than a very temporary interference with pro-

washing machines . . . . planes . . . . .



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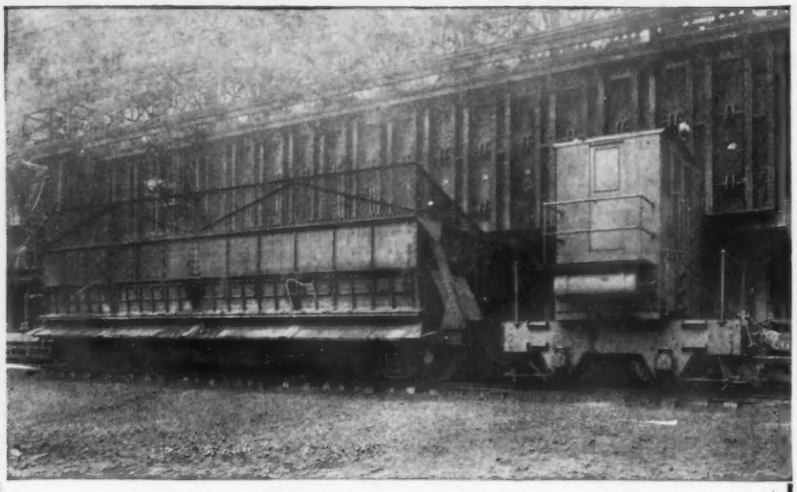

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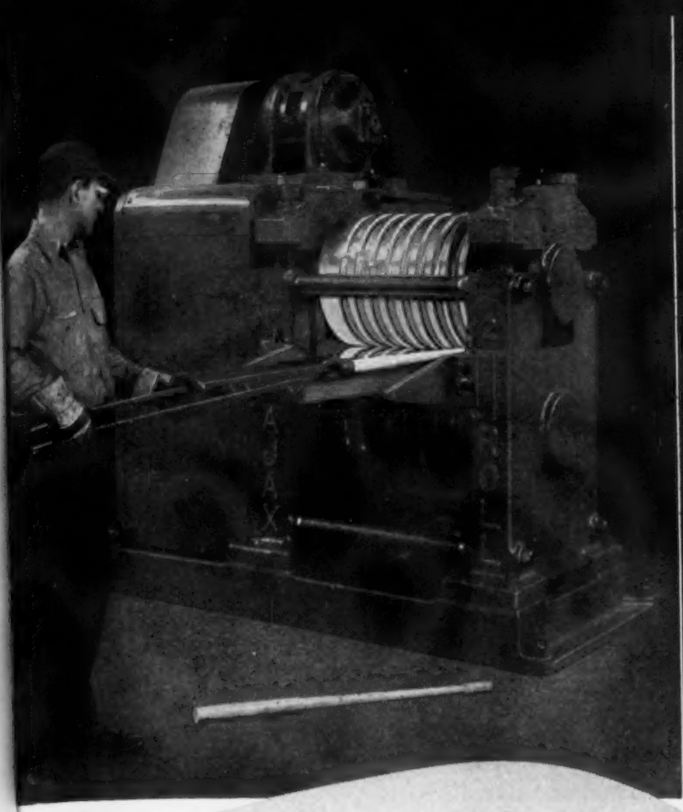
duction, and even though new blast furnaces as well as a cogging and a continuous billet mill are needed, the existence of auxiliary services and a suitable melting shop to provide at least part of the ingots required, cuts down the time of building and the total cost to less than a third of that at the new Northamptonshire plant.

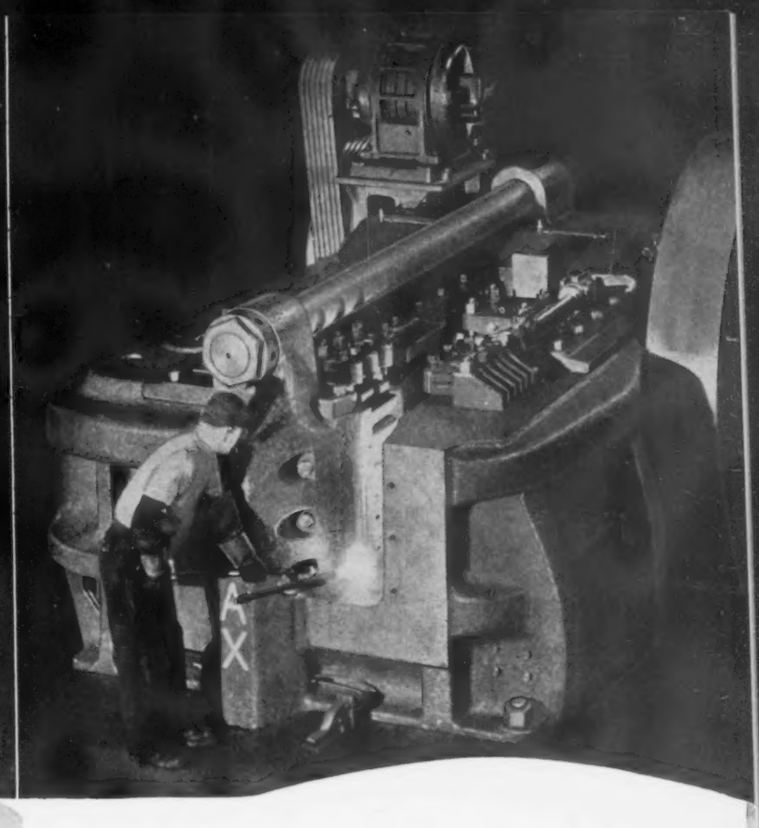
While it is important to decide at once on the plans to come in the first stages, the timing of the later projects can be subject to adjustment according to the capacity at plant makers and other considerations which may bear on the position nearer the time of erection.

IMPORT OF MACHINERY: Broadly speaking the total cost of the construction program will be divided as to 65 pct in civil engineering, buildings, cranes, furnace structures; 15 pct on electrical equipment, and 20 pct on rolling mills and ancillary machinery. On the civil engineering side there should be adequate capacity to undertake the necessary work and the main problem is likely to be obtaining the necessary labor. Electrical equipment will require gearing in with the load placed on the electrical industry by the Central Electricity Board program. The supply of the rolling mill equipment is likely to be one of the main factors limiting the rate at which the plan as a whole can be achieved.

The weight of rolling mill machinery required will be approximately 100,000 gross tons. This represents about half the total expenditure under the general heading of rolling mills and ancillary equipment. The total capacity for building rolling mill machinery in this country is not likely to be more than 15,000 gross tons a yr over the next few years. Of this, 3000 tons may be considered necessary for export and 2000 tons for general repair work.

This will leave a maximum of 10,000 gross tons a yr for steel plants. Assuming that the whole of the plan is started within the next five yr, and the completion of some of the items takes two or three yr longer, the total mill output possible from home sources would be not more than 70,000 gross tons. This leaves 30,000 gross tons to be imported if the





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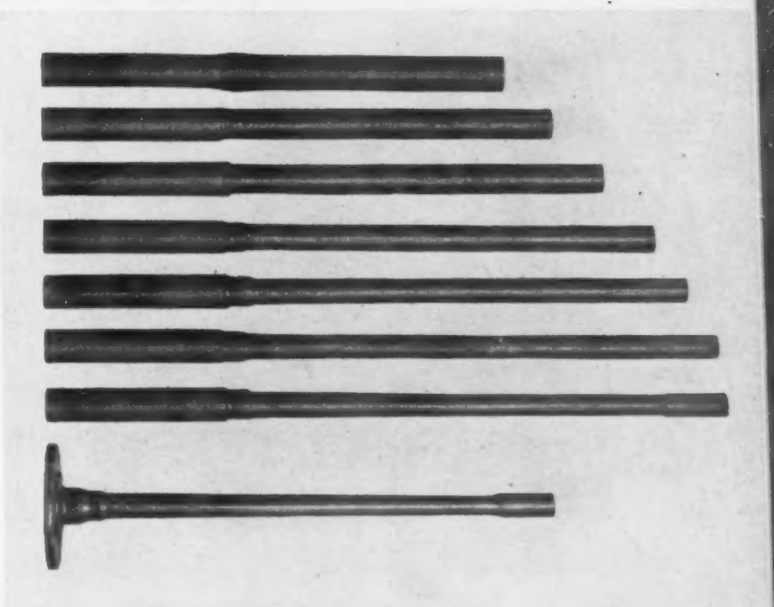
When called for, the tapered wheel seat can be rolled at the same heat. When a flange is required, the end is reheated and upset accurately and close to dimensions in an Ajax Forging Machine.

Write for Bulletin 91-A



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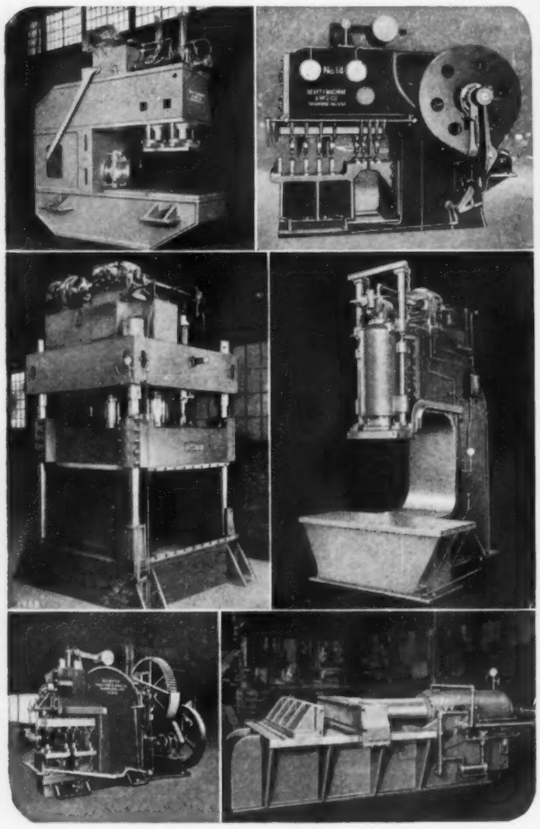

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plan is to be achieved reasonably in time.

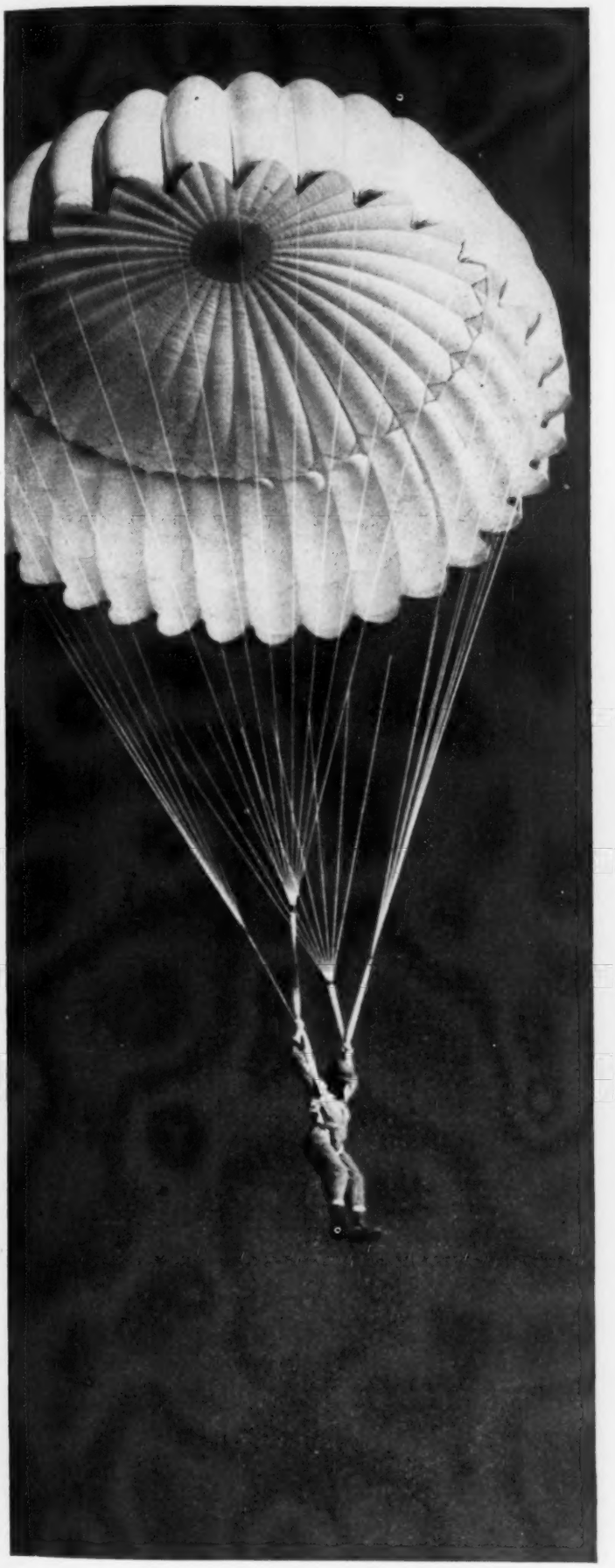
It is unlikely that once the heavy modernization program is completed there will be a permanent demand for steelworks machinery in excess of 10,000 gross tons a yr. The right policy, therefore, appears to be to aim at the efficient production from domestic supplies of this tonnage and to accelerate the building over the next few years by import.

The proposed import is about 20,000 gross tons of rolling mill machinery for the South Wales sheet and tinplate plan and about 5000 gross tons of rolling mill machinery for the broad flange beam mill, in addition to which an allowance of 5000 gross tons has been made for special rolling mill machinery of various kinds.

It is only by imports to this extent that it will be possible to complete the sheet and tinplate project and the broad flange beam project in reasonable time. If no imports are available the above two programs would not be completed until at least two yr later and the plan as a whole would take three to four yr longer to complete.

It is considered that serious harm would be done to the United Kingdom export trade if this delay took place, quite apart from the fact that it would be necessary to import from the United States and elsewhere a tonnage of steel products for longer than would otherwise be necessary. The cost of the imported equipment suggested for the above two plans, having an output of over one million tons, would be $28,000,000 out of a total expenditure involved in the schemes of about $160,000,000, the balance of expenditure being incurred on material and labor in this country. The total cost of the imports of machinery covering all the plans will be approximately $36,000,000.

The United States is the only source from which new plant could be purchased. There remains, however, the possibility of obtaining plant from Germany. While there may be isolated units which would be of assistance to a minor extent in achieving the plan, the only major contribution would be the possibility of transferring machinery from the Hermann Goering works.



When G. I. Jimmy parachuted down into an isolated Chinese village of 20 people, he learned a lot about his own U.S.A. His story checks so closely with our ideas that we've written a booklet about it . . .

Jimmy was cut off from civilization for seven months. As he watched the primitive existence of the natives, who toiled their entire lives for the bare necessities of living, he began to realize what it was that made America great.

He thought of his old job as an appliance salesman, and saw for the first time how every sale he made, made money for many other people. He saw that everybody's energy and intelligent efforts help everybody else in America, and for that reason all are far better off.

And Jimmy figured out one more thing . . . that as long as people concentrate on the idea of *keeping men and money at work,* prosperity will be no problem in this country.

The booklet we mentioned follows this thought to its logical conclusion. Originally printed for our employees, it is called "Not by Bread Alone."

Your request will bring a copy, and if you think it would interest your employees, let us know.

★ ★ ★

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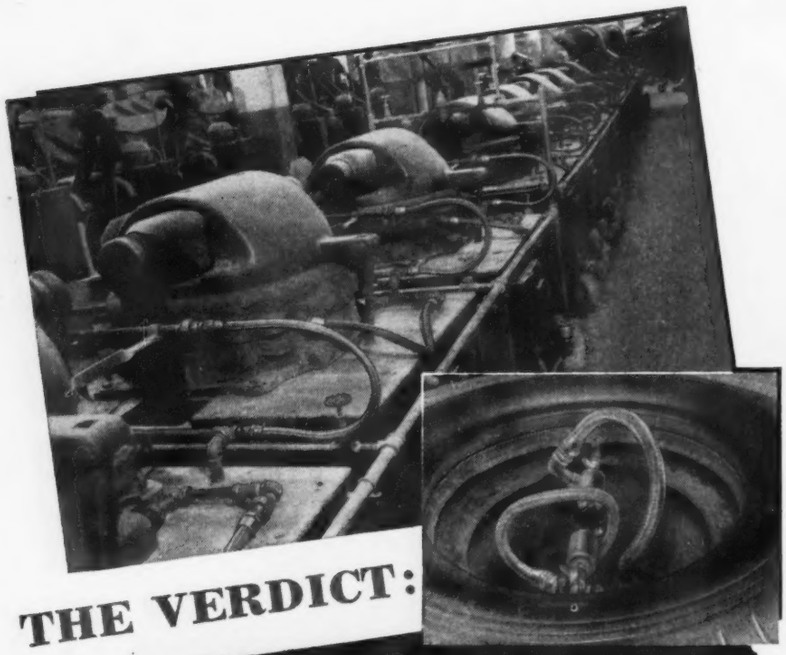

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Plants: Maywood and Elgin, Ill.

Weekly Gallup Polls

(CONTINUED FROM PAGE 99)

ing for increases of approximately 50 pct above present rates. This bill, H R 6084, is now before the Senate.

Recent polls by the Institute have found a majority of Americans favoring a program calling for greater social mixing of officers and enlisted men. It approves the idea of officers and enlisted men eating the same food, attending the same clubs, enjoying the same social privileges.

The public is also found in favor of continuing the draft for another year. A majority do not think that enough volunteers will join the army to make it possible to postpone drafting from May to October.

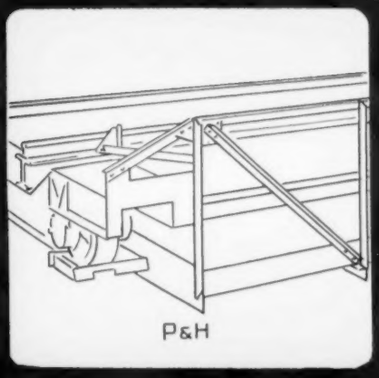
London Economist

(CONTINUED FROM PAGE 103)

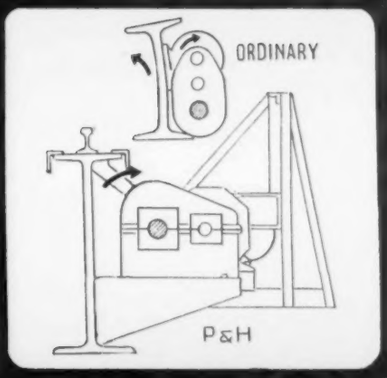
If the Yugoslavs merely desired to redress an ethnical wrong done to them in the past, they would certainly have every reason to be satisfied with this solution. The incorporation of Trieste in Yugoslavia would, however, create new ethnical grievances, this time on the side of the Italians. Here, accordingly, the Yugoslavs (and the Russians) leave the ground of ethnical argument and claim that Yugoslavia needs Trieste for economic reasons, since it is the only big harbor on the Adriatic coast. Fiume, as well as its rival Susak (which the Yugoslavs developed between the wars just as the Poles developed Gdynia near Danzig), are handicapped by very poor lines of communication inland.

ITALY, runs the Yugoslav argument, does not really need Trieste, because it has many other big ports. Under Italian rule, Trieste was neglected because its economic connection with Italy was only very loose. Between the wars the traffic of Trieste hardly reached the level to which it had risen under Austrian rule. In fact, during most of that period its traffic was considerably lower; and it increased only shortly before 1939 as a result of the Fascist penetration of the Balkans. Trieste also suffered from the competition of Venice. In future, conclude the Yugoslavs, Trieste under Italian rule would

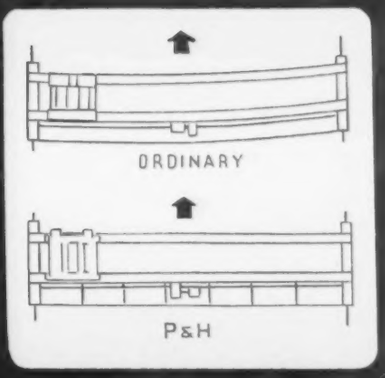
Gives P&H I-Beam Cranes Greater Rigidity and Reduces Maintenance



★ "Third Beam," or handrail, connected to trucks, is actually a husky latticed bridge member supporting bridge drive, cab and footwalk.



★ "Third Beam," through its rigid horizontal bracing to trucks and I-beam, reinforces I-beam and prevents twisting due to torque of bridge drive.



★ "Third Beam" prevents end-to-end weaving of bridge when moved. This is particularly important on sudden starts and stops or short bridge travel.

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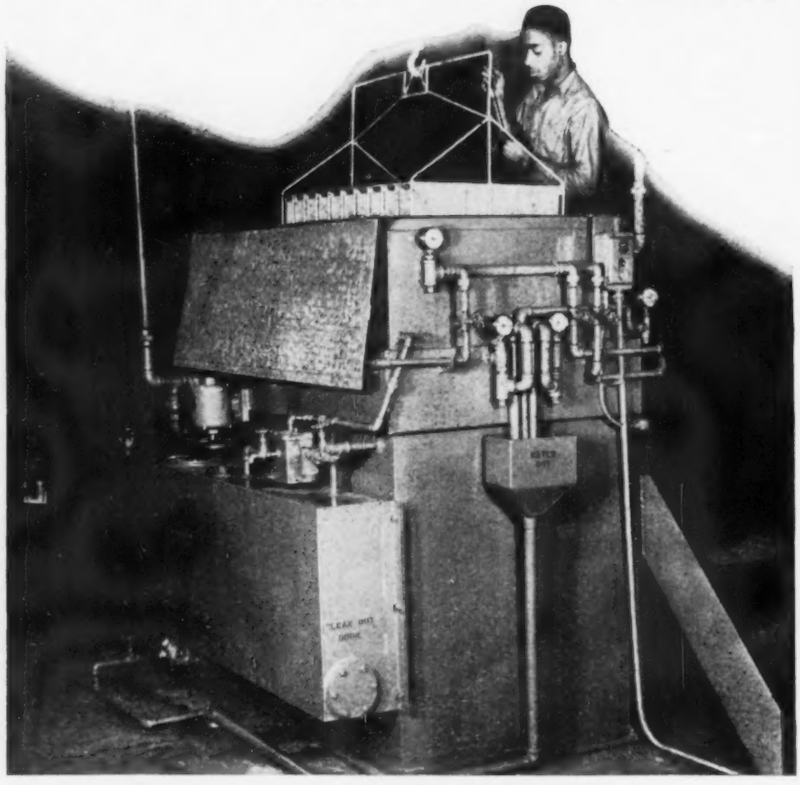

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either continue to decay because of the competition of other Italian ports, or would be kept alive artificially as a springboard of renewed Italian penetration of the Danube Basin. Trieste's natural prosperity lies therefore in union with Yugoslavia.

It is difficult to refute the negative parts of the Yugoslav argument. Under Italian rule Trieste undoubtedly worked at a loss. But this loss was made good by Adriatic tariffs and official subsidies to Triestine shipowners. The port also suffered from a virtual Yugoslav boycott, as well as from a massive diversion of the trade of Austria-Hungary's "successor states" from the Adriatic to the North Sea and river routes. The political configuration of Eastern and Central Europe after this war is certain to create even stronger handicaps for Trieste under Italian control. But it also seems certain that Trieste will not be better off—it may even be much worse off—if it is transferred to Yugoslavia.

The Yugoslavs have no maritime tradition, and their own trade is not likely to be big enough to keep Trieste busy. Thus all the arguments used against leaving Trieste with the Italians apply *a fortiori* to transferring it to Yugoslavia. The crux of the problem is that by its geographical position and commercial traditions Trieste is the natural harbor of neither Italy nor Yugoslavia. It is the natural harbor of the whole Central European area that once formed the Austro-Hungarian Empire. For 15 yr, from 1923 to 1937, not less than 46 pct of Trieste's traffic was with Austria and Czechoslovakia. Yugoslavia's share was nine pct and Hungary's five. Thus, in spite of the inter-war diversion of Central European trade, the countries of the former Hapsburg Empire still accounted for nearly 60 pct of the whole turnover of Trieste. Since Trieste was the only big harbor of that Empire, this is not surprising; and the old Austro-Hungarian railway system was to a large extent adjusted to enable Trieste to play this exclusive role.

On purely economic grounds it would therefore seem that Trieste's future can be secured only if under changed political circumstances the city is enabled to play its old commercial role *vis-a-vis* its wide Central European hinterland. There is

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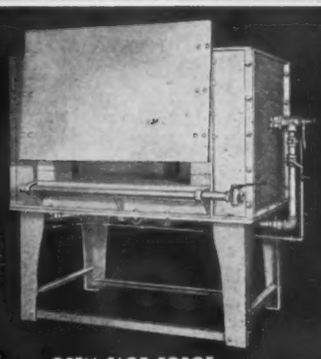
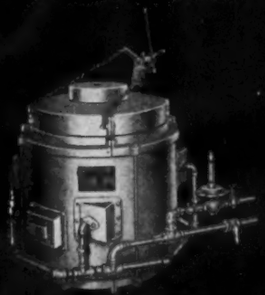
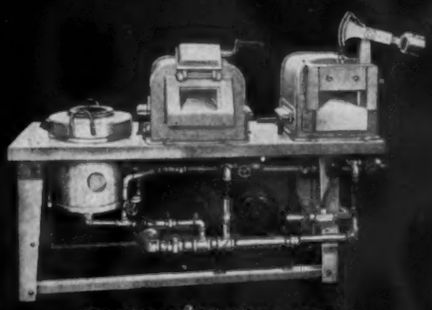


OPEN SLOT FORGE

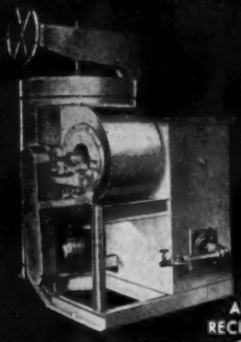


STATIONARY METAL MELTING FURNACE

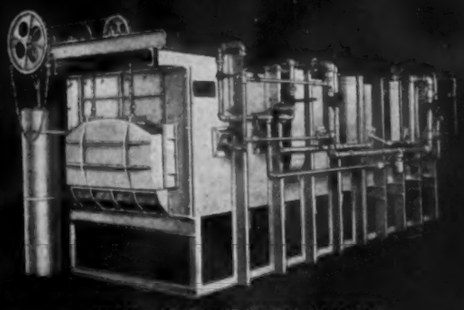


TRIPLE PURPOSE COMBINATION

SMALL FORGE



AIR DRAW RECIRCULATING FURNACE



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thus a strong case for the idea that Trieste should be established as a free city, meeting the economic needs of both Italy and Yugoslavia, but primarily serving the Danubian countries. It is, therefore, somewhat surprising that, so far, discussion in Paris has centered on the conflicting proposals for the incorporation of Trieste either in Italy or in Yugoslavia and that no side has advanced the project of creating a Free City of Trieste.

Pyschologically; this omission may be understandable. The last war started from the conflict over the Free City of Danzig. Should a new Danzig be created on the Adriatic? Nevertheless, a close analysis shows that the analogy is not so ominous. Danzig became a running sore primarily because it separated East Prussia from Germany. A Free City of Trieste would not be a wedge driven into Italian territory, and would not create a new corridor on the Adriatic coast. As a Free City, Danzig enjoyed considerable economic prosperity in spite of strong competition from Gdynia.

There is no reason why Trieste, with no such rival near and with its excellent facilities and modern shipyards at Monfalcone, should not prosper in independence. Again, the Free City of Danzig was certainly not the cause of the war, but its pretext. Similarly, Trieste might conceivably become the pretext for a new war, but only if such a pretext were sought by one or the other of the Great Powers. And, if it were, there would in any case be no lack of pretexts. Another advantage which a Free City of Trieste would enjoy compared with Danzig, lies in the fact that it would not be situated between two states of such strikingly unequal strength as Germany and Poland. Defeated Italy and victorious Yugoslavia will for some time to come be of almost equal strength, unless one of them is deliberately strengthened and armed by a mighty protector. In that case, of course, no approximate balance of power between Italy and Yugoslavia would preclude filibustering, or the repetion of a *coup de force* such as D'Annunzio's seizure of Fiume.

Finally, in the light of the impasse reached at Paris, the establishment of a Free City of Trieste would seem to be the most obvious line of compromise on which the

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Illustrated 108-p booklet describes post-war applications for broaching operations and answers many questions on broaching. *LaPointe Machine Tool Co.*

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Catalog presents all speed nut fastening devices used prior to the war plus recently developed fasteners. A wide variety of standard-shaped speed nuts to replace ordinary nuts and lock washers, as well as hundreds of special fasteners to meet special needs are shown. *Tinnerman Products, Inc.*

(9) Eaton Products:

Booklet illustrates and describes complete line of products the firm is now making and plans to make in the future. Included are truck axles, rotor pumps, cold drawn steel, gray iron castings and engineered stampings. Production facilities are also covered. *Eaton Mfg. Co.*

(10) Input Controller:

Folder gives operating principle and specifications on the electronic balancer input controller, which may be installed in any electric furnace temperature control system. *Automatic Temperature Control Co.*

(11) Plastic Coating:

Nukemite, an acid and alkali proof plastic coating developed during the war, is now available for general industrial use. It is said to assure absolute protection against acids, alkalies and solvents. Booklet covers properties and characteristics of Nukemite and possible applications. *Nukem Products Corp.*

(12) Carbide Operations:

Activities of the corporation which fall into five major groups—alloys and metals, chemicals, carbon products, industrial gases, and plastics are discussed in detail here. Booklet contains a condensed summary of products and indicates how they are used. *Union Carbide & Carbon Corp.*

(13) Feed Water Control System:

Significant data on the feed water control system for world's largest forced-circulation boiler with illustrations and diagrams are contained in this booklet. *Northern Equipment Co.*

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Various single and multiple spindle models of the box column floor drills, bench drills, radial drills and ball bearing motor driven bench and floor drills, floor drill with enclosed belt guard and others are covered in this booklet. Complete specifications are given. *Canedy-Otto Mfg. Co.*

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Catalog describes ball and roller bearing covers. Detailed dimension tables permit groups of parts to be selected for almost any bearing or cup listed. *Bearing Appliance Co.*

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Described in this booklet are many applications of steam detergent cleaners for cleaning machinery, equipment and parts for repairing; the preparation of surfaces for repainting, cleaning equipment too large for tank immersion and paint stripping. *Oakite Products, Inc.*

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Booklet 4150 describes relief valve applications in steam, air, gas and other services. Also given is revised sizing data on relief valves, which includes capacity and pressure rise tables. *Cochrane Corp.*

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Booklet gives performance characteristics, composition and fabricating details covering wide variety of cast-to-shape tool steels. Applications covered include cutter bodies, cams, rolls, forming dies, ring dies, etc. *Jessop Steel Co.*

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Folder describes the Lectro-Count, a device that accurately counts and records by remote control parts produced on any motor-driven machine, in units of per minute, per hour or per day. Time required to make each piece is also recorded. *Lansing Engineering Co.*

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(25) Corrosion of Steels:

How various commercial steels may reasonably be expected to resist the attack of atmospheric corrosion in particular is indicated in this booklet. The summary includes only information now generally accepted as reliable. *U. S. Steel Corp.*

(26) Dust Control:

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(27) Fuel Loss Calculator:

A slide rule type of calculator for heat loss determination is available from this company. The figures on the calculator reveal the per cent of total heat loss in the flue gas. Instructions accompanying the calculator show how heat loss can be converted into fuel loss. *Hays Corp.*

(28) Shock and Noise Insulation:

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(29) Batteries:

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(30) Swedish Grinders:

Catalog contains detailed description of the features of the Swedish Lidkoping grinders and attachments for handling work pieces by the through-feed and infeed method. Attachments include axial movable grinding wheel spindle for grinding tapered seats and shoulders. *Triplex Machine Tool Corp.*

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(32) Carbide Tools:

Condensed catalog presents a complete description of standard carbide tools and masonry drills. Specifications and prices are given in table form. *Metro Tool & Gage Co.*

(33) Motor Service Plans:

The motor exchange plan, shop repair plan and national service plan, three service plans covering fractional horsepower motors, are covered in this booklet. Details of the three plans, who is entitled to use them and how they operate are described. *Westinghouse Electric Corp.*

(34) Metal Marking Equipment:

Metal indenting, marking and numbering machines, as well as steel type and holders, steel stamps, detail presses and other marking equipment are described in new catalog. Prices and complete specifications are given. *William A Force & Co.*

(35) Steel Flanges:

Tables give complete dimensions and specifications on standard type and special drop-forged flanges offered. Prices and pressure-temperature ratings are also included. *Harrisburg Steel Corp.*

(36) Cranes:

Construction and engineering details of the company's standard and broad gauge diesel and gasoline locomotive cranes are described in catalog. Cranes feature engine compression braking and roller bearing swing and dimension charts. *Orton Crane & Shovel Co.*

(37) Slide Chart:

A new slide chart for calculating the velocity flow and capacities of heat exchangers is offered. Chart also shows information and data on areas of diameters of tubes, a pressure table and a table of weights for round stainless steel tubing. *Carpenter Steel Co.*

(38) Alloy Castings:

The story of Rotocasting, the production of castings by the use of centifugal force, is given in catalog 2041. Rotocastings are made in sizes from 2½ in. to 28 in. OD, and in lengths up to 12 ft. with wall thicknesses ranging from ¼ to 2 in. Physical properties and applications of heat and corrosion resisting castings produced by the company are covered in detail. *National Alloy Steel Div., Blaw-Knox Co.*

(39) Plastics:

Complete information, including general properties and applications, covering cellulose acetate, ethyl cellulose, polystrene and vinyl compounds is given in booklet. Also shown are reference tables of comparative properties, weights and measures, and fractions and temperatures. *Chemasco Corp.*

(40) Metal Disintegration:

A low-voltage, high-ampere current flow to create a high temperature arc at point of contact is used in the Thomas process of metal disintegration. Folder illustrates new features and accessories available with the super model disintegrator. *Clinton Machine Co.*

(41) Motor Generators:

Bulletin 202 gives construction details and features of motor-generators for electrolytic processes. Typical applications include sulfuric acid anodizing, electrocoloring, electroplating and electrogalvanizing. *Electric Products Co.*

(42) Car Shakeout:

The Robins car shakeout, described in this folder, is a portable unit for emptying hopper bottom railroad cars. The unit is placed on top of the car, resting on the two sides. When current is turned on, it sets up a rhythmical seismic action which is transmitted throughout the car at a frequency of 1000 cycles per min. Unit permits emptying hopper-bottom cars of free-flowing materials in as little as 90 sec. *Robins Conveyors, Inc.*

5/23/46

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Great Powers could agree. Any other solution is bound to create suspicion and hostility between them. The Western Powers cannot agree to transfer Trieste to Yugoslavia because this would help to make Russian influence in the Danubian Basin even more exclusive than it is and than it should be. Conversely, Russia is certainly afraid that, if Trieste is left with Italy, this Adriatic gate to Central Europe will pass under the exclusive control of the Western Powers. There is every reason to make the contested strip of the Adriatic littoral into a no-man's-land between East and West—or rather to allow both East and West to use the gate on equal terms.

Republic Buys N. Y. Mine

New York

• • • **The Republic Steel** Corp. has announced that it had bought all shares of the Witherbee Sherman Corp. owned by the National City Bank of New York at $2.75 a share, and would purchase all Class A, B and C shares in the hands of other owners at the same price. Letters have been addressed to the stock-holders making this offer.

Truck Trailer Design Gains from Wartime Research Development

Detroit

• • • **Users of postwar** truck trailers will benefit as the result of research and engineering developments carried on during the war according to A. K. Tice, vice-president in charge of sales, Fruehauf Trailer Co. Included in the new line of commercial trailers built by Fruehauf are new suspension systems; new body design employing aluminum panels and lining; new body types; redesigned skeleton framework; increased braking capacity and new year-round air conditioning units for refrigerator vans. In addition, Fruehauf has resumed production of stainless steel trailers which are completely redesigned.

Mr. Tice explained that the new suspension system eliminates leaf springs. In this new type tandem-axle construction, springing is centrating plant at Port Henry.

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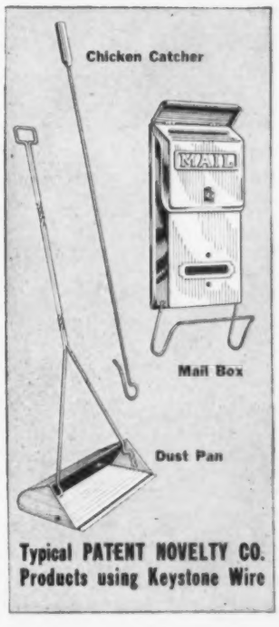
KEYSTONE Wire in PATENT NOVELTY CO. Products



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Keystone wire finds its way into an impressive line of hardware specialties and novelties . . . made by the Patent Novelty Company of Fulton, Illinois.

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achieved through the twisting action of torsion bar springs. Axles operate independently of one another, permitting automatic steering or trailing of the axles for normal highway travel. Trailers utilizing the new type suspension have ability to "lean-in" on turns thereby counteracting the action of centrifugal force.

Through the use of new aluminum body panels the panel weight of some models has been reduced by more than 50 pct, it was said.

For transporting frozen foods and other perishables new types of refrigerator vans are now available. The freezing unit is mounted in the nose of the trailer and is capable of maintaining a constant temperature with an air circulation of 1800 cu ft per min; the unit can be used to supply either heating or cooling as needed, eliminating the necessity for ice, brine or charcoal heaters.

Several significant changes have been made in the construction of stainless steel trailers according to Mr. Tice. The roof of the new trailers has been changed to a heavier corrugation, with double the number of welds to the crossmembers for additional strength. Rear doors embody a boxed frame design providing stiffness, and smooth door panels contribute to greater cleanliness of the rear of the trailer.

Initiates Program To Determine Values Of Thermal Conductivity

Cleveland

• • • **A new program** to provide more accurate and dependable values of thermal conductivity for most of the insulating materials on the market has been initiated by the committee on research of the American Society of Heating & Ventilating Engineers, according to L. P. Saunders, chairman, and will be carried out by the technical advisory committee on insulation.

First step in the program, and a move which is now actively underway, is checking and accrediting laboratories which will do the actual testing in accordance with the new ASTM Code. This code (ASTM C177-45), which is the result of joint action of the American Society of Heating & Ven-

tilating Engineers, the American Society for Testing Materials, the American Society of Refrigerating Engineers, and the National Research Council, now provides a standardized testing procedure for the determination of thermal conductivity.

All of the commercial and university laboratories which are known to have hot plate equipment are being canvassed to determine whether their equipment conforms to ASTM C177-45 standards, and whether they are willing to undertake tests to establish correlations and determine the relative accuracy of the various pieces of test equipment.

To all the laboratories having acceptable equipment and indicating a willingness to participate in the plan, the ASHVE research laboratory will send a sample of insulating material. This sample will be tested in accordance with the ASTM C177-45 Code and returned, together with test results, to the ASHVE research laboratory here. The same sample will then be sent to the National Bureau of Standards, Washington, where it will again be tested. Accreditation of laboratories will be made on the basis of their ability to check within acceptable tolerances the values obtained at the Bureau of Standards.

As soon as possible a list of approved laboratories will be made available to manufacturers of insulating materials, and they will be urged to have their products checked at one of the laboratories listed. It is hoped that the progress of this program will permit the limiting of "K" values for insulating materials to be published in the ASHVE Guide 1949, to those determined in accordance with this new ASTM Code.

Currently published tables of conductivity values for insulating materials indicate that they have been determined by various laboratories, at various mean temperatures, and probably with various types of equipment. Also, improvement in insulating material during the past few years indicates a need for the rechecking of insulating values. In addition to insulations, many other building materials, which could be readily tested by the hot plate method, should have their "K" values redetermined.

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New Officers Elected By Chapter of Steel Warehouse Association

Cleveland

• • • **The following chapters** of the American Steel Warehouse Assn., Inc., have elected officers for the coming year, Walter S. Doxsey, president of the association, announces:

Baltimore Chapter

President, Arthur M. Pfeiffer, Dietrich Bros., Inc., Baltimore; vice-president, Harold Dell, John J. Greer & Co., Inc., Baltimore; secretary-treasurer, J. D. Boan, U. S. Steel Supply Co., Baltimore; chapter director, George J. Parke, Eagleston-Parke, Inc., Norfolk, Va.

Buffalo Chapter

President, A. Stanley Vedder, Brace-Mueller-Huntley, Inc., Syracuse, N. Y.; vice-president, L. N. Stetson, Peter A. Frasse & Co., Inc., Buffalo; secretary-treasurer, W. H. Kline, Jr., Burke Steel Co., Rochester, N. Y.; chapter director, J. Frederick Rogers, Beals McCarthy & Rogers, Inc., Buffalo.

Kansas City Chapter

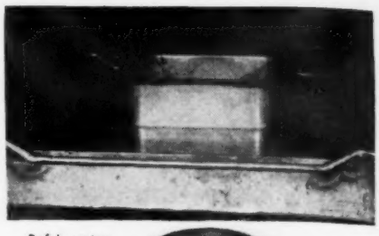
President, John A. Rudisill, Geo. C. Christopher & Son Iron Works, Wichita, Kan.; vice-president, K. P. Sexton, Consolidated Supply Co., Picher, Okla.; secretary, H. A. Hofflander, Tulsa Boiler & Machinery Co., Tulsa, Okla.; chapter director, Fred L. Evans, Steel Mfg. & Warehouse Co., Kansas City.

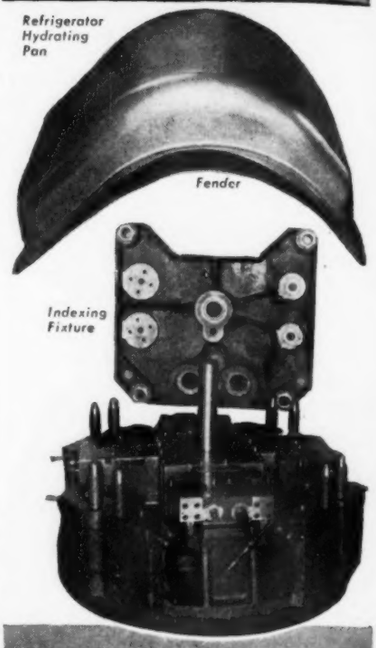
New York Chapter

President, Charles Kramer, U. S. Steel Supply Co., Newark, N. J.; first vice-president, William Carter, Faitoute Iron & Steel Co., Inc., Newark, N. .; second vice-president, Albert Bragg, Egleston Bros. & Co., Inc., Long Island City, N. Y.; secretary-treasurer, William C. Hughes, Bright Steel Corp., New York, N. Y.; chapter director, P. O. Grammer, Grammer, Dempsey & Hudson, Inc., Newark, N. J.

Northwest Chapter

President, J. K. Rittenhouse, U. S. Steel Supply Co., St. Paul; vice-president, R. H. Hobbs, W. H. Hobbs Supply Co., Eau Claire, Wis.; secretary-treasurer, S. C. Brennom, Paper, Calmenson & Co., St. Paul; chapter director, J. K.





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Because of its unusual qualities cast-to-shape dies of Strenes metal outserve dies of more conventional metals many times over.

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Have us identify a few users—you can contact them for the "low-down" on Strenes metal as a tooling program expediter.

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Rittenhouse, U. S. Steel Supply Co., St. Paul.

Omaha Chapter

President, Ray Wilkinson, Paxton & Vierling Iron Works, Omaha, Neb.; vice-president, C. W. Helstrom, Globe Machinery & Supply Co., Des Moines, Iowa; secretary-treasurer, C. H. Hayes, Omaha Steel Works, Omaha, Neb.; chapter director, Henry Neef, Gate City Iron Works, Omaha, Neb.

Pittsburgh Chapter

President, H. E. Williams, Williams & Co., Inc., Pittsburgh; vice-president, Bennett Oliver, McKee-Oliver, Inc., Pittsburgh; vice-president, T. J. Gillespie, Lockhart Iron & Steel Co., Pittsburgh; secretary, Marcus Boyd, Boiler Tube Co. of America, Pittsburgh; treasurer, F. B. Lorenz, Edgar T. Ward's Sons Co., Pittsburgh; chapter director, T. L. Lawry, Steel Products Co., McKees Rocks, Pa.

St. Louis Chapter

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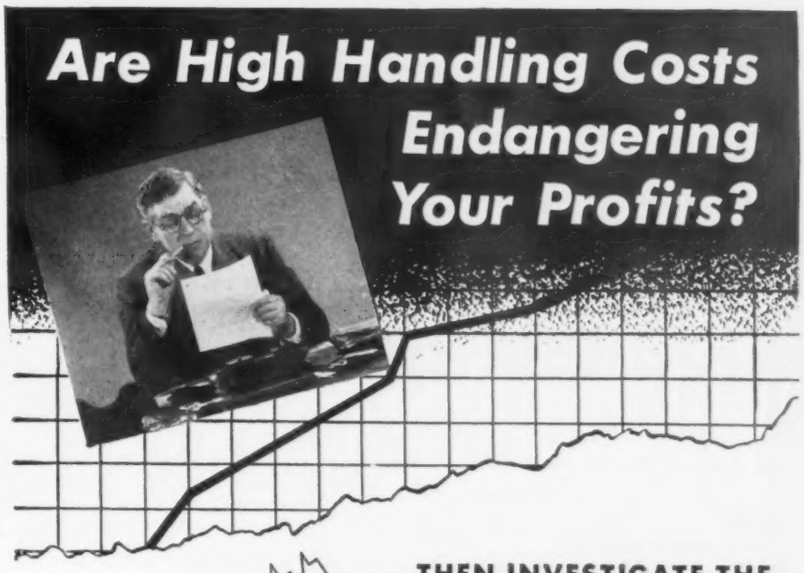

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WAA Authorizes New Dealers to Negotiate Surplus Tool Sales

Washington

• • • With 136 added during the Apr. 1-15 period, the total number of "approved dealers" authorized to negotiate sales of government-owned surplus machine tools was 1710 in mid-April, according to the War Assets Administration. In addition, another 138 dealer appointments had been authorized by WAA regional offices and were awaiting action by the Agency-Dealer Section of the WAA machine tool div. in Washington. Besides those approved, WAA regional offices had on hand as of Apr. 15 a total of 351 dealer-agency applications in process of screening and approval.

From inception of the plan about Jan. 1 through Apr. 15 these "approved dealers" had sold a total of $33,042,695 (original cost) of surplus machine tools and certain other items of equipment. The recovery on these sales was $16,530,062.

"Approved dealer" sales of the past month by two week periods were as follows:

	Original cost	Sold for
Mar. 16-29	$ 6,586,582	$3,389,255
Apr. 1-15	10,741,875	5,288,476

As of Mar. 23, the latest period for which firm overall sales figures have been compiled, the WAA field offices had sold $168,921,000 worth (original cost) of machine tools for $88,717,000. These figures are inclusive of sales made by "approved dealers."

The on-hand inventory of machine tools available for sale as of Mar. 23 was reported at $518,167,000, showing an increase of $75,057,000 over the Feb. 28 inventory and reflecting the fact that acquisitions of machine tools declared surplus and available for sale continue to exceed sales.

April 1-15 appointments of "approved dealers" to sell government-owned machine tools follow:

ATLANTA OFFICE

Joseph R. Johnston Machinery & Equipment, 1003 Spring St., NW, Atlanta, Ga.

BIRMINGHAM

Wimberly & Thomas Hdwe. Co., Inc., 1305 N Eighth Ave., Birmingham.

CHICAGO

Midwest Supply Co., 516 Kenwood St., Hammond, Ind.
Martin F. Morrison, 425 Belmont Ave., Chicago
Industrial Salvage Material Co., 718 E Bay St., Milwaukee
Ball Machinery Sales, 39 S LaSalle St., Chicago
L. M. Keller, 1127 Washington Blvd., Oak Park, Ill.
Meyer Supply Co., 170 N Clinton St., Chicago
Kearney & Trecker Corp., 6784 W National Ave., Milwaukee
W. B. Manchester, 201 Nicholson St., Joliet, Ill.
Hallahan & Sterling, 415 45 Ave., Bellwood, Ill.
Sampson Machine Works, 508 W Water St., Decorah, Iowa

CLEVELAND

The Vaughn Machinery Co., Cuyahoga Falls, Ohio
DoAll Pittsburgh Co., 507 Second Ave., Pittsburgh

COAST-TO-COAST ON ONE LUNG: *Taking time out for a smoke is Tom Fetch, driver of the 1902 one-cylinder Packard that completed the first successful transcontinental trip ever made in an automobile. "Old Pacific" models such as these sold for $2500, weighed 2000 lb and carried 80 lb. pressure in 34 x 4 tires. This car on loan form Edison Institute, will participate in the Golden Jubilee parade of automotive oldsters to be held in Detroit June 1.*

A. R. Jones Co., 18609 St. Clair Ave., Cleveland
Continental Salvage & Machinery Corp., 1836 Euclid Ave., Cleveland
H. L. Ayres Machinery Co., P. O. Box 45, Columbus, Ohio
C. R. Ruse Co., 234 Spitzer Bldg., Toledo
General Commerce Co., Marshall Bldg., Cleveland
Laurens Brothers, 2780 Highland Ave., Norwood, Cincinnati
The Chas. M. Ingersoll Co., 19930 Detroit Road, Rocky River, Ohio
Vernon L. Johnson, 555 E Bowman St., Wooster, Ohio
Cantwell Machinery Co., 830 N Cassady Ave., Columbus, Ohio
DoAll Cincinnati Co., 342 Reading Road, Cincinnati
Cincinnati Milling & Grinding Machines, Inc., 4701 Marburg, Cincinnati
James M. Kulka, 1033 Parkway Blvd., Alliance, Ohio

DENVER

Garwood C. Anderson & Associates, 1010 17th St., Denver, Col.

DETROIT

L. J. Fenton & Son, 3408 David Broderick Tower, Detroit
C. E. Jordan & Co., 308 Boulevard Bldg., Detroit
John S. Brinck & Associates, 600 Michigan Bldg., Detroit
Franklyn K. Morgan & Co., 7432 Cass Ave., Detroit
The Knowles Service, 1546 Penobscot Bldg., Detroit
Kord Supply Co., 2925 Waverly St., Detroit
G. & E. Equipment Sales, 7310 Woodward Ave., Detroit
Ernest K. Baldwin Co., 2354 National Bank Bldg., Detroit
Carl F. McLaren, 991 Mohegan, Birmingham, Mich.

JACKSONVILLE

Harry P. Leu, Inc., 100 W Livingston, Orlando, Fla.

LOUISVILLE

Metal Mfg. Corp., 30th & Garland Sts., Louisville
Equipment & Engineering Service of Kentucky, 785 S Clay St., Louisville
Fink Equipment Co., 103 Board of Trade Bldg., Louisville

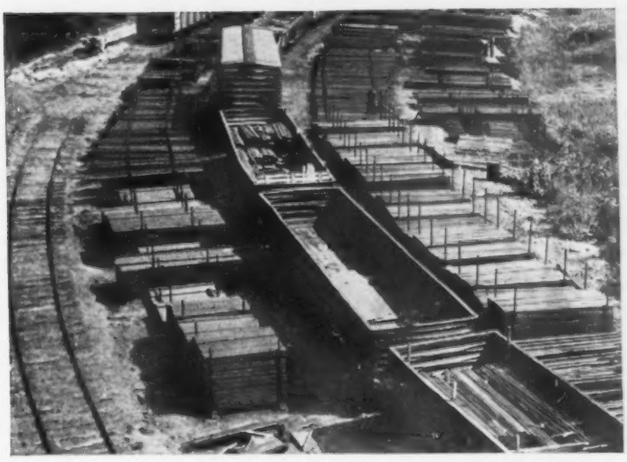
NASHVILLE

Inland Equipment Co., 1608 Harrison St., Nashville, Tenn.
C. D. Friss & Co., 800 Exchange Bldg., Nashville, Tenn.
Dabney Industrial Supply Co., P. O. Box 4446, Memphis, Tenn.
Summer Avenue Welding & Machine Works, 2999 Summer Ave., Memphis, Tenn.
Baron Iron & Equipment Co., P. O. Box 601, Chattanooga, Tenn.

NEW YORK

The Industrial Trading Co., 30 Church St., New York
Frederick H. Hicks, 415 S First Ave., Highland Park, N. J.
Martin F. Gronachan, 25 11th Road, Broad Channel, L. I., N. Y.
Fostrade Corp., 68 William St., New York
Charles M. Evans, 29 Blackburne Terrace, West Orange, N. J.
DoAll Rochester Co., Inc., 293 Central Ave., Rochester, N. Y.
Hugh A. Brown, 235 36th Ave., Douglaston, L. I., N. Y.
Saul Berman, 104 Fifth Ave., New York
Reliable Machinery Exchange, 174 Centre St., New York
North American Supply Corp., 225 Broadway, New York
J. H. Trading Corp., 110 William St., New York
Warren Ricketts, 2 Allen Square Bldg., Jamestown, N. Y.
John A. Voskamp, 611 W 177th St., New York
U. S. Equipment Co., 40 Journal Square, Jersey City
H. J. Zoubek Co., Hillside, N. J.
Heimlich Bros., 136 W 25th St., New York
Richards Co., 173 Main St., Hackensack, N. J.
Hudson County Machine & Tool Co., 14 Manning Ave., Jersey City
James G. Cavanaugh, 1744 Troy Ave., Brooklyn
Clyde Iron Works, Inc., 856 E 136th St., New York
P. F. Booth, 19 Rector St., New York
Bronx Machinery Exchange, 2590 Third Ave., Bronx, N. Y.
Egbert B. Colven, 25 Clark St., Brooklyn
Commander Machine Co., 1212 Ocean Ave., Brooklyn

$2,000,000 Worth of Boiler Tubes Rust-Proofed with TECTYL



Compelled to store $2,000,000 worth of boiler tubing outdoors — because of the wartime shortage of building material — this large manufacturer of marine boilers for our naval and merchant ships chose Tectyl 506 to save the huge stock from rust.

At times the storage yards were covered so deeply with snow that it was difficult to locate the tubing. But in spite of this extreme exposure, Tectyl gave unfailing protection.

Now returned to peacetime production, this company continues to specify Tectyl for the prevention of rust and corrosion.

One Application of Tectyl Protects against Rust and Corrosion up to 2 Years

- Tectyl is not a paint; it leaves a thin, transparent film that keeps the metal in plain sight. Tectyl need not be removed for inspection.
- Tectyl is easy to apply — brush on, flush on, dip, or spray.
- Tectyl is easy to remove with kerosene or any ordinary hydrocarbon or naphtha compound. Tectyl saves time and labor.
- Tectyl is economical — a little Tectyl protects a lot of metal — Tectyl provides *low-cost-per-square-foot protection!*
- Tectyl is made in many specialized types; there's a Tectyl solution for every rust problem.

Phone, write, or wire for Tectyl bulletin and specific recommendations for your needs. Please describe metals and types of exposure encountered.

VALVOLINE **TECTYL** *ENDS RUST*

FREEDOM-VALVOLINE OIL COMPANY

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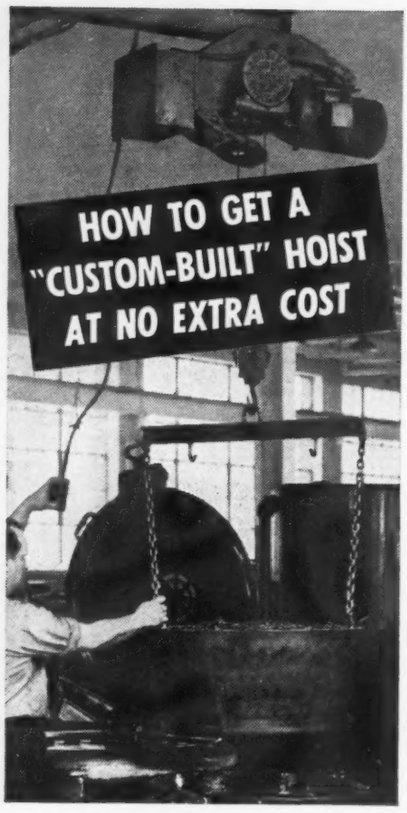

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The Reading Unit Construction Plan gives you a choice of several standard interchangeable mechanisms. With this plan you can select the type of suspension, control, hoisting and motor unit that best suits your job requirements. Imagine the advantages you get in a hoist "tailor made" to your own specifications! If your operating conditions change, you can modernize—and save costs—by simply changing one or two units.

See your distributor for more information on Reading's Unit Construction Plan or write us today for your copy of "144 Answers To Your Hoisting Problems."

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OVERHEAD TRAVELING CRANES

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Flick Contracting Co., 1515 E Bay Ave., Bronx, N. Y.
Industrial Machinery Corp., 147 Provost St., Jersey City
Myron Jenner, 251 W 92nd St., New York
Magnus Machine Tool Co., Ltd., 38-02 22nd St., Long Island City, N. Y.
Theodore Mann Co., 405 Lexington Ave., New York
McCabe Machinery Co., 42 Wendt Ave., Larchmont, N. Y.
Samuel Moskow, 856 Flushing Ave., Brooklyn, N. Y.
Production Specialties, Inc., 345 Madison Ave., New York
Joseph Sorgen, 615 Crown St., Brooklyn
Walther S. Weiss, 881 W 181st St., New York
Weslemain Co., Inc., 565 Fifth Ave., New York
Callite Tungsten Corp., 540 39th St., Union City, N. J.
William H. Ludwig, 656 Bushwick Ave., Brooklyn
Reliance Mica Co., Inc., 341 39th St., Brooklyn
Ferdinand J. Snow, 38 Washington Ave., Hillsdale, N. J.
Standard Machinists, 595 Central Park Ave., Yonkers, N. Y.
John W. Wiegand, 190 Hillside Ave., Mt. Vernon, N. Y.
Wright & Williams Specialty Mfg. Co., 131 Woodbine Ave., East Rochester, N. Y.
C. M. Broadwell, Mason St., Morrisonville, N. Y.
R. E. Brooks Co., 50 Church St., New York
Cassell Machinery Co., 506 Central Ave., Newark, N. J.
Jack Niebuhr, 25 Lincoln Park, Newark, N. J.
Peerless Machinery Co., 208 Lafayette St., New York
Porto Rico Iron Works, Inc., 120 Wall St., New York
Elgood Materials Co., 313 W 53rd St., New York
W. S. Gallagher Co., 841 Grant St., Buffalo
Garnet Corp., 69 Glenwood Place, East Orange, N. J.
Mahoney-Clark, Inc., 217 Pearl St., New York
T. H. Pitt Co., 57 Sip Ave., Jersey City
R. D. Stevenson, 33 W 42nd St., New York
Albert W. Travis, 21 Hillview Terrace, Glen Rock, N. J.
A. Zitenfield, 158 E 40th St., New York
Claridan Machinery Co., 152 Cheoman Ave., Nutley, N. J. and 10 Atkins Court, Clifton, N. J.
Plant Surplus Co., 25 Second St., Perth Amboy, N. J.

NEW ORLEANS

Patrick H. Dillon, 524 Howard Ave., New Orleans

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Petroleum Equipment, Inc., Central Bldg., Tulsa, Okla.
Robertson Sales Co., P. O. Box 1102, Oklahoma City, Okla.
DoAll Tulsa Co., 301 E Fourth St., Tulsa, Okla.
P-W Supply Co., 614 Petroleum Bldg., Tulsa, Okla.
C. H. Rawson, 207 Masonic Temple Bldg., Tulsa, Okla.

PORTLAND

Surplus Sales Co., 329 SW First Ave., Portland, Ore.
Surplus War Supply Co., 224 E Greenwood, Bend, Oregon
Premier Gear & Machine Works, 1700 NW Thurman St., Portland, Ore.
Harry M. Euler Co., 225 SW First Ave., Portland, Ore.

RICHMOND

James S. Spivey, 704 H-2660 Woodley Road, NW Washington, D. C.
Donald S. Sampson, 1101 Vermont Ave., NW Washington, D. C.
W. W. Livchak, 33 Chinquapin, Alexandria, Va.
Stanley Berg & Co., 1026 Shoreham Bldg., Washington, D. C.
Maryland Distributors, Inc., 129 E Main St., Elkton, Md.
Samler Machinery & Equipment Co., 11 E Fayette St., Baltimore
Tom Norton, 202 N Crater Road, Petersburg, Va.
R. T. Overstreet, 522 Wainwright Bldg., Norfolk, Va.
Midwest Steel Corp., Court & Dryden Sts., Charleston, W. Va.
C. P. McDonald, 1101 Vermont Ave., Washington, D. C.

SALT LAKE CITY

Arnold Machinery Co., 153 W Second South, Salt Lake City

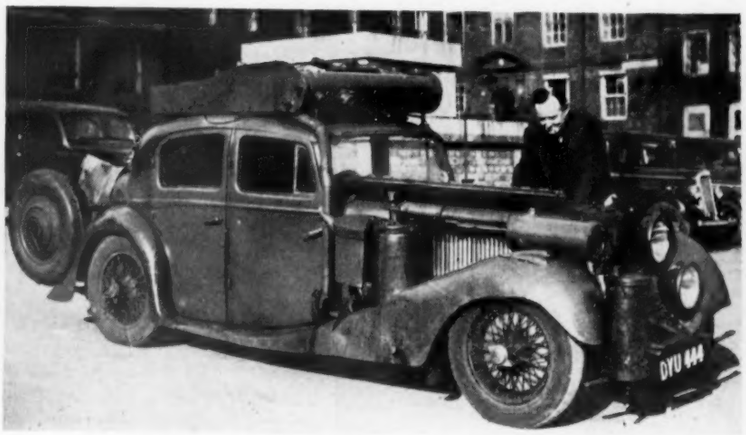
SAN FRANCISCO

Holstead Machinery Sales, 8033 Ney Ave., Oakland, Calif.
Taggart & Bumb, 132 N 16th St., San Jose, Calif.
Pelican Machinery Co., 1535 Elm St., Klamath Falls, Ore.

SPOKANE

Braden Tractor & Equipment Co., 102 E Poplar, Walla Walla, Wash.
Tinling & Powell, 706 Sprague Ave., Spokane
Towne & Bremer, 520 W Second Ave., Spokane
Hofius-Ferris Equipment Co., 728 Mallon Ave., Spokane
Inland Machine Works, 534 W Main St., Walla Walla, Wash.

EVERYTHING BUT THE KITCHEN SINK: *S. R. Edgedale, London lawyer, had adapted a gas production plant to his car which has enabled him to run over* **150,000** *miles on coke, anthracite, charcoal and sawdust at a cost of* **150** *miles to* **1** *cwt of anthracite or coke.*



Analyzes Machine Tool Surplus Position At Engineering Meeting

Cleveland

• • • **If machine tools** are to be looked upon as a brake on inflation, our brakes are in pretty good condition and well adjusted, Charles J. Stilwell, president, Warner & Swasey Co., told members of the Cleveland Engineering Society recently.

C. J. STILWELL

Outlining the machine tool industry's position, Mr. Stilwell pointed out that during normal peacetimes the entire machine tool industry in this country is a small one, producing between $100,000,000 and $150,000,000 worth of machinery a year.

"If we were standing back in 1936 and looking forward, I do not think I would prophesy that the machine tool industry, averaging good times with bad, would exceed by a very large margin an average of $150,000,000 a year in order to take care of the requirements of manufacturing industries in the years ahead, even allowing for a normal increase in the total volume of manufacturing production," he said.

Mr. Stilwell traced the steps in the development of the government-owned machine tool surplus, noting that the machine tool industry began to feel in 1936 an increased demand for export that very definitely arose from the war preparations going on in England, France, Japan and Russia. "From then on until the day we entered the war, that demand continued to exceed our normal demand," he pointed out.

"From 1940 to 1945 the total value of machine tools produced in this country was $4,600,000,000. Those machine tools were put into production in plants that were producing for war. About $900,000,000 worth were exported during the war, and it is to be assumed that practically all of those machines that were shipped to our Allies were also engaged in the production of war equipment.

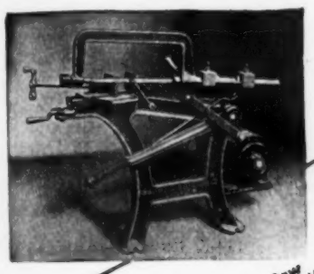
"After war production ceased," Mr. Stilwell recalled, "our government possessed idle machine tool equipment no longer needed for war purposes—that is, surplus. It previously had been assumed that our government would quickly dispose of that valuable productive surplus. Although it had been created for war purposes and purchased with the people's money, it became a valuable productive asset when war ended. This surplus should have been converted rapidly to the uses of peace and become productive of goods in the greatest possible quantity for distribution to all the people.

"From the total $4½ billion less the $900 million for export, we had approximately $3,700,000,000 worth of machine tools. It was proposed that some of those machines be set aside and held by the armed services as emergency stand-by equipment. As nearly as we have been able to ascertain, this stand-by equipment approximated $300,000,000. That leaves some $3,400,000,000 still in surplus, and from that let us subtract, for quick computation, $400,000,000 for equipment representing machine tools specially designed for munition manufacture which cannot be employed in peacetime production.

"Now, if you will go back to 1940 and assume, for very conservative estimating, that we would have produced a maximum of $1,200,000,000 over that 6-yr period if there had been no war, we find, finally, that we have in our surplus pile of machine tools somewhere between $1,800,000,000 and $2,000,000,000 worth of machine tools to distribute into industrial production.

"By and large," Mr. Stilwell declared, "the largest percentage of that surplus was in such shape that it could have been quickly adapted to the manufacture of automobiles, lawn mowers and baby carriages. It represented 8 to 10 yr of abnormally high average peacetime production for the entire machine tool industry.

"The disposal of surplus did not get underway quickly, and this is



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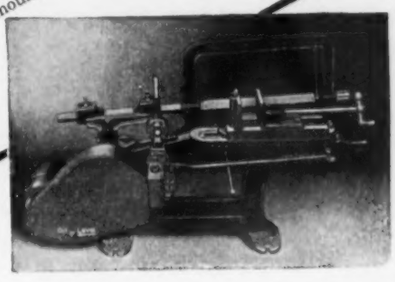

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not entirely to be wondered at, for the disposal of surplus machine tools was only a small part of many billions of dollars of surplus war property that would represent a tremendous task, even if it were not to be done under the bureaucratic inefficiency of the government.

"Many manufacturers converting from war production found themselves under the necessity of ordering new machine tools much more rapidly than they could be secured from government surplus property disposal agencies, with the result that the machine tool industry, even in this first year of peace, has been producing machine tools at a rate far above what we consider a normal peacetime production.

"Added to this abnormally large production of new machine tools, we must remember that there is still available a large percentage of government surplus of machine tools which we hope may be transferred with increasing rapidity over to civilian production. In fact, a point has now been reached where sales from this government surplus about equal the shipments of new machines from the plants of machine tool builders," he concluded.

Patent Office Plans To File German Documents

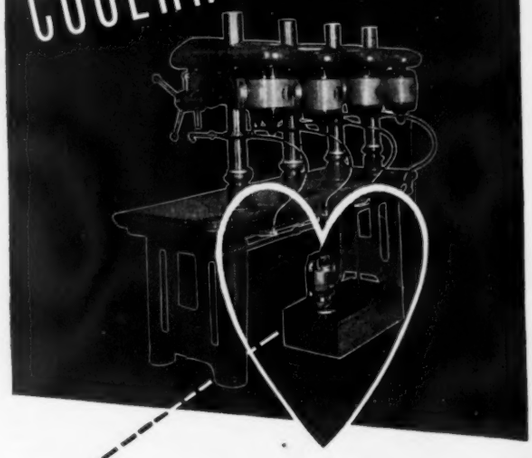
Washington

• • • **Ten tons of documents** taken from the German Patent Office are now being sorted and evaluated and will eventually be disseminated for the benefit of American science and industry, Casper W. Ooms, Commissioner of Patents, announced.

Prior to 1939 patent information was regularly exchanged between Germany and this country, Mr. Ooms said. Since then, however, thousands of German patents have been issued of which this country has no knowledge. It is this file of patents issued during the war that is of particular interest to the United States Patent Office, and many of these patents will be placed on file in the Patent Office Search Room for public use.

At the same time OPB will bring the documents to the attention of the American public. Each document selected as worthwhile will be abstracted and listed in OPB's weekly "Bibliography of Scientific and Industrial Reports," which is available on subscription.

THE HEART OF YOUR COOLANT SYSTEM



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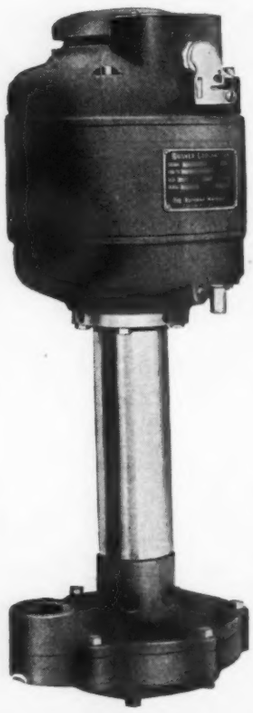

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